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"Solid and Usefull Knowledge"
An Analysis and Comparison of the *Philosophical Transactions* and the *Journal des Sçavans*, 1665-1670

by

Judith Ellen Friedman ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial

fulfillment of the requirements for the degree of Master of Arts

in

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "'Solid and Usefull Knowledge': An Analysis and Comparison of the *Philosophical Transactions* and the *Journal des Sçavans*, 1665-1670" submitted by Judith Ellen Friedman in partial fulfillment of the requirements for the degree of Master of Arts in History.

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Abstract

The first intellectual journal, the French *Journal des Sçavans*, and the first scientific journal, the English *Philosophical Transactions*, both came into being in early 1665. This thesis first analyses and then compares the contents, style, and use of these two journals between 1665 and 1670 concentrating on the journals' interactions with the communities that they served. The *Journal des Sçavans* and the *Philosophical Transactions* were two very different journals. They reflected the nature of mid-seventeenth century scientific and intellectual communities in England and France, communities that were developing in response to unique social and political realities. The *Journal des Sçavans* and the *Philosophical Transactions* were created to meet the needs of their audiences and, in turn, they helped to guide the development of their respective communities and the rules that they were developing to govern scientific and intellectual discourse within and between their members.

Acknowledgments

There are many people without whose friendship and help this thesis would not have been possible.

First and foremost, I would like to thank my family for all their support. I am especially grateful to my Mother and brother James for reading and commenting on my thesis and to my sister Jeni for her help in creating the tables which appear in the appendices.

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I would like to thank Dr. Julian Martin for reading and commenting upon an earlier draft of this thesis. Thanks also go to all of my friends and colleagues in the Department of History and Classics but I would especially like to thank Lisa Smith, Larissa Kotowich, and Bob Cole for all of their advice and support.

I also owe many thanks to Mrs. P. Honoré for her instruction and help in translating the French, Latin, and Italian segments of the journals.

In addition, I would like to thank two very special people whose friendship I have valued for a long time. Thanks go to the now "Dr." Suk-kun Lee for her support and friendship through all of this and for braving the library at closing time to track down a translation for the mysterious "adiousteray." I also thank Matthew Skelton who likewise has always lent me a sympathetic ear, or is that email? and braved the mysterious Ashmolean Library at Oxford for me on very short notice to help me try to track down the publication date of James Gregory's *Exercitationes Geometricae*.

Special thanks go to Dr. R .K. Merton who very kindly took an interest in my work. His comments and suggestions were invaluable in helping me work out several concepts explored in this thesis.

[I]t is therefore thought fit to employ the *Press*, ... To the end, that such [philosophical] Productions being clearly and truly communicated, desires after solid and usefull knowledge may be further entertained, ingenious Endeavours and Undertakings cherished, and those, addicted to and conversant in such matter, may be invited to search, try, and find out new things, impart their knowledge to one another, and contribute what they can to the Grand design of improving Natural knowledge.

Henry Oldenburg, "The Introduction,"
Philosophical Transactions 1 no. 1 (1665): 1-2.

Le dessein de ce Iournal estant de faire sçavoir ce qui ce passe de nouueau dans la Republique des lettres .... Le seul denombrement des choses qui le composeront pourroit suffire pour en faire connoistre l'vtilité. Mais i'adiousteray qu'il sera tres aduantageux à ceux qui entreprendront quelque ouurage considerable puis qu'ils pourront s'en seruir pour publier leur dessein, & inuiter tout le monde à leur communiquer les manuscripts, & les pieces fugitiues qui pourront contribuer à la perfection des choses qu'ils auront entreprises.

Denis de Sallo, "L'Imprimevr av Lectevr,"
Journal des Sçavans 1 no. 1 (1665): i.

Table of Contents

Introduction 1

Chapter 1: Scientific Societies and Communication to 1665 13

Chapter 2: The *Philosophical Transactions* 31

Chapter 3: The *Journal des Sçavans* 62

Chapter 4: Relations between the journals: The Gregory-Huygens Dispute 86

Conclusion: Different Communities, Different Needs, Different Journals 102

Bibliography 115

Appendix 1: General Information 144

Appendix 2: Analysis of Interests in the *Philosophical Transactions* 147

Appendix 3: Analysis of Interests in the *Journal des Sçavans* 151

Appendix 4: Attempted Comparisons of the *Philosophical Transactions* and the *Journal des Sçavans* 155

List of Tables

Table Page

1-1. General Information on the Contents of the *Philosophical Transactions* . . 145

1-2. General Information on the Contents of the *Journal des Sçavans* 146

2-1. Analysis of the Contents of the *Philosophical Transactions* (Book Reviews Included) 148

2-2. Analysis of the Contents of the *Philosophical Transactions* (Book Reviews Excluded) 149

2-3. Analysis of the Contents of the *Philosophical Transactions* (Book Reviews Alone) 150

3-1. Analysis of the Contents of the *Journal des Sçavans* (Book Reviews Included) 152

3-2. Analysis of the Contents of the *Journal des Sçavans* (Book Reviews Excluded) 153

3-3. Analysis of the Contents of the *Journal des Sçavans* (Book Reviews Alone) 154

4-1. Analysis of the *Philosophical Transactions* According to *Journal des Sçavans* Areas of Interests (Book Reviews Included) 156

4-2. Analysis of the *Philosophical Transactions* According to *Journal des Sçavans* Areas of Interests (Book Reviews Excluded) 157

4-3. Analysis of the *Philosophical Transactions* According to *Journal des Sçavans* Areas of Interests (Book Reviews Alone) 158

4-4. Analysis of the *Journal des Sçavans* According to *Philosophical Transactions* Areas of Interests (Book Reviews Included) . 159

4-5. Analysis of the *Journal des Sçavans* According to *Philosophical Transactions* Areas of Interests (Book Reviews Excluded) 160

4-6. Analysis of the *Journal des Sçavans* According to *Philosophical Transactions* Areas of Interests (Book Reviews Alone) . . . 161

Introduction

Intellectual and scientific journals were first published in 1665. The first of these journals, the *Journal des Sçavans*, was published in Paris in January under the editorship of Denis de Sallo.[1] Approximately two months later in early March, the *Philosophical Transactions*, edited by Henry Oldenburg, began publication in London.[2] Historians have often assumed that these two journals had a great deal in common. Both were created to spread what Oldenburg called 'solid and usefull knowledge' and to serve the members of learned communities in their endeavours. However, as this thesis will show, the *Journal des Sçavans* and the *Philosophical Transactions* were in fact quite dissimilar. They were created to serve distinct communities and audiences. The editors of these journals had very different plans for their creations and unique interpretations of what they considered 'usefull knowledge' and the role of a journal to be. The *Journal des Sçavans* was created to provide educated Parisians with reviews of books available in Paris and news which might be of interest to them. In contrast, the *Philosophical Transactions* was created to communicate strictly natural philosophical information and served as a communications nexus for an international, although primarily British, clientele.

Both the *Journal des Sçavans* and the *Philosophical Transactions* contained material dealing with natural philosophy and both have, at various times, been called "the first scientific journal." Which of these journals actually deserves this title has formed something of a perennial question for scientific and literary historians. Older studies often give the *Journal des Sçavans* precedence over the *Philosophical Transactions* on the grounds that it was published first.[3] Some historians have even gone so far as to claim that the *Philosophical Transactions* was based upon the *Journal des Sçavans*.[4] However, most modern scholars agree that since the *Philosophical Transactions* contained only material relating to natural philosophy while the *Journal des Sçavans* published book reviews in many subject areas, biographies, and news as well as scientific material, the *Philosophical Transactions* deserves to be called the first scientific journal.[5] The answer to the question often depends upon what definition of "scientific journal" is being employed. Some scholars have chosen to avoid the question entirely by referring to these early journals as "learned" rather than as "literary" or "scientific."[6] Additionally, many of those who have examined these early journals have come to the conclusion that the *Philosophical Transactions* and the *Journal des Sçavans* were significantly different, and formed the basis for two very different kinds of later periodicals. The *Philosophical Transactions* became the template for later journals reporting only scientific news and discoveries and the format of the *Journal des Sçavans* was copied by journals that concentrated on book reviews and were meant for a more general audience.[7] This conclusion is supported by the results of this study. As will be seen, the *Journal des Sçavans* and the *Philosophical Transactions* represent very different journalistic styles and were consciously maintained as different publications by their editors.

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[1] The *Journal des Sçavans* was also published in a slightly altered version in Amsterdam. For this study I examined only the official Paris edition and all references to the *Journal des Sçavans* refer to this edition published by Jean Cusson. The title of the journal has changed several times over the past 300 years. The original title, *Journal des Sçavans*, was in use between 1665 and 1790 and as such is the one that I employ in this study. In 1791 the title changed to *Journal des Savans* and the modern title, *Journal des Savants*, was first used in 1833. Jean Longnon, "Le Troisième Centenaire du Journal des Savants," *Journal des Savants* (1965): 7.

[2] The title of this journal has undergone several changes over the years. Oldenburg's original title was *Philosophical Transactions: giving some Accompt of the Present Undertakings, Studies and Labours of the Ingenious in many Considerable Parts of the World*. In 1753, when the Royal Society took official control of the journal, the title changed only slightly, "Accompt" being replaced with "Account." The modern title, *Philosophical Transactions of the Royal Society of London*, was first used in 1776 and has remained unchanged since that time. I will be employing the shortened title, *Philosophical Transactions*, throughout this essay.

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[3] Betty Trebelle Morgan, *Histoire du Journal des Sçavans depuis 1665 jusqu'en 1701*, (Paris: Les Presses Universitaires de France, 1929), 17, 240, 248-249; Martha Ornstein, *The Rôle of Scientific Societies in the Seventeenth Century*, (Chicago: University of Chicago Press, 1928), 199; Although modern scholarship does not generally call the *Journal des Sçavans* the first scientific journal, a few scholars continue to agree with the earlier definition. Bernard Houghton, *Scientific Periodicals: Their Historical Development, Characteristics and Control*, (London: Clive Bingley, 1975), 12; A.A. Manten, "Development of European Scientific Journal Publishing before 1850," in *Development of Science Publishing in Europe*, ed. A.J. Meadows, (Amsterdam: Elsevier Science Publishers, 1980), 6.

[4] This is most often seen in the work of French historians. See for example: Morgan, *Histoire*, 90-91, 174, 248-249; P. Sergescu, "Les Mathématiques dans le Journal des Savants: Première periode 1666-1701," *Osiris* 1 (1936): 569.

[5] Robert Gascoigne, *A Historical Catalogue of Scientific Periodicals, 1665-1900: With a Survey of Their Development*, (New York: Garland Publishing, 1985), 115; May Katzen, "The Changing Appearance of Research Journals in Science and Technology: An Analysis and a Case Study," in *Development of Science Publishing in Europe*, ed. A.J. Meadows, 177-214, (Amsterdam: Elsevier Science Publishers, 1980), 182; David Kronick, *A History of Scientific & Technical Periodicals: The Origins and Development of the Scientific and Technical Press, 1665-1790*, 2d ed. (Metuchen: The Scarecrow Press, 1976), 77; David Kronick, "Notes on the Printing History of the Early *Philosophical Transactions*" *Libraries and Culture*, 25 (1990): 244; Marie Boas Hall, *Promoting Experimental Learning: Experiment and the Royal Society 1660-1727*, (Cambridge: Cambridge University Press, 1991), 60.

[6] Harcourt Brown side-stepped this issue completely by defining the journals as "learned" rather than "scientific." See: Brown, *Scientific Organizations in Seventeenth Century France (1620-1680)*, (Baltimore: Williams & Wilkins Co., 1934; reprint, New York: Russell & Russell, 1967), 185-207; "History and the Learned Journal," *Journal of the History of Ideas*, 33 (1972): 365-378. Sherman Barnes used the terms "learned" and "scientific" journals interchangeably in his work: S. Barnes, "The Beginnings of Learned Journalism, 1665-1730," (Ph.D. diss., Cornell University, 1934); "The Scientific Journal, 1665-1730," *Scientific Monthly* 38 (1934): 257-260; "The editing of early learned Journals," *Osiris* 1 (1936): 155-172.

Even though the *Journal des Sçavans* and *Philosophical Transactions* are sources of a wealth of information about seventeenth-century natural philosophy, very little scholarly work has been done on these journals. In the twentieth century there have been only two lengthy studies of the *Journal des Sçavans*, one historical and one literary, neither of which dealt with the use of the journal to communicate scientific information. The first study, by Betty Trebelle Morgan, provided a general history of the journal under its early editors. She concentrated on the literary and religious topics covered by the *Journal des Sçavans* and emphasized its importance as the first critical journal.[8] She did mention the role of the *Journal des Sçavans* in communicating scientific information as part of her larger argument that the journal was an agent of progress in the battle between the ancients and the moderns.[9] Unfortunately, she does not seem to have been familiar with the contents of the *Philosophical Transactions* and so overstated the importance of the articles published in the *Journal des Sçavans*.[10] She also incorrectly described the journal as the "organe officieux" of the Académie des Sciences but then suggested that the reason so little of its work appeared in the early years of the journal was that "a ses débuts, l'Académie ne se fit guère connaître que par cet organe."[11] Despite the very general nature of this study it remains the only lengthy examination of the *Journal des Sçavans* to take into account the partially scientific nature of its contents. Shorter studies of the journal are equally rare and I have only discovered one that examined the scientific contents of the journal.[12] The literary and religious aspects of the journal have been somewhat more examined; the second major twentieth-century study of the journal concentrated on its literary contents.[13]

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[7] R.G.A. Dolby, "The Transmission of Science" *History of Science*, 15 (1977): 9; Kronick, *Scientific & Technical Periodicals*, 63, 77-81, 246; Douglas McKie, "The Scientific Periodical from 1665-1798," in *Natural Philosophy Through the 18th Century and Allied Topics*, ed. Allan Ferguson (London: Taylor & Francis, 1948; reprint, London: Taylor & Francis, 1972), 125; Ornstein, *Scientific Societies*, 202.

[8] Morgan, *Histoire*, 17-23, 92-95.

[9] *Ibid.*, 157-166.

[10] For example, although she praises the *Journal des Sçavans* for publishing a wide variety of opinions on the nature and motion of the comet of 1664/5, she seems unaware of the fact that French scholars, particularly Adrien Auzout, were publishing very different theories in the *Philosophical Transactions*. There will be a further discussion of this in Chapter 3. *Ibid.*, 101-102.

Although more studies have been carried out on the *Philosophical Transactions* than on its French counterpart, it too has been curiously under-utilized as a historical source. Indeed, many modern studies of the Royal Society do not take information available in the pages of the *Philosophical Transactions* into account.[14] The journal has been examined as one of several early periodicals.[15] It has also been examined by bibliographers.[16] Studies of the *Philosophical Transactions* by historians of science fall into two categories. The most popular method of analysing the journal is to examine the *Philosophical Transactions* selectively at various times over its history. May Katzen studied one volume of the journal approximately every fifty years in order to describe the development of the scientific journal.[17] Charles Bazerman selected what he defined as every "experimental" article in chosen volumes of the *Philosophical Transactions* in order to trace the development of the scientific article from the seventeenth to the twentieth century.[18] The most recent analysis of the journal looked at the changes that have occurred in citation style since 1665. Bryce Allen, Jian Qin and F.W. Lancaster examined the journal in selected years in order to trace the development of scientific citation practices.[19] The less popular method of studying the scientific journal is to examine it intensively over several consecutive years. The only such twentieth-century examination of the *Philosophical Transactions* that I have found was carried out by R.K. Merton as part of his 1935 doctoral dissertation.[20] Merton's study was extremely influential, but not because of his analysis of the journal.[21] Merton analysed the *Philosophical Transactions* by placing each article in the journal into categories based on the ones

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[11] The relationship, or lack thereof, between the *Journal des Sçavans* and the Académie des Sciences will be discussed in Chapter 3. *Ibid.*, 153, 157.

[12] Sergescu listed the high points of the mathematical contents of the *Journal des Sçavans* between 1666 and 1701 but did not analyse them or remark upon them besides placing them in their context in the development of modern mathematics. Sergescu, "Les Mathématiques," 568-583.

[13] Harcourt Brown offers a very brief review of literature concerning the *Journal des Sçavans* in a bibliographical note to his article. Brown, "Learned Journal," 378. The second in-depth study of the journal was carried out by Vivian Little. Little, "Dramatic Criticism in the *Journal des Sçavans* 1665-1750," (Ph.D. diss., Johns Hopkins University, 1938).

[14] For example, Steven Shapin does not use relevant articles in the *Philosophical Transactions* in his studies although he does utilize Oldenburg's correspondence. This is unfortunate as I believe that information contained in the articles in the journal could be used to strengthen his arguments significantly. Steven Shapin, "O Henry," *Isis*, 78 (1987): 417-424; "The House of Experiment in Seventeenth-Century England," *Isis*, 79 (1988): 373-404; *A Social History of Truth: Civility and Science in Seventeenth-Century England*, (Chicago: University of Chicago Press, 1994); Shapin and Simon Schaffer. *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, (Princeton: Princeton University Press, 1985).

[15] The *Philosophical Transactions* has been examined in context with other early scientific periodicals. S. Barnes, "Learned Journalism,"; "The Scientific Journal," 257-260; "Early learned Journals," 155-172; Eugene Barnes, "The International Exchange of Knowledge in Western Europe, 1680-89," (Ph.D. diss., University of Chicago, 1947), 21-45. The *Philosophical Transactions* has also been examined as one of several early English periodicals. Richmond Bond, "Introduction," in *Studies in the Early English Periodical*, ed. R.P. Bond, (Chapell Hill: University of North Carolina Press, 1957), 5, 27, 31-33; Bond, *Growth & Change in the Early English Press* (Lawrence: University of Kansas Libraries, 1969), 15-16; Carolyn Nelson, "American readership of early British serials," in *Serials and their readers 1620-1914*, ed. Robin Myers and Michael Harris, (Winchester: St Paul's Bibliographies, 1993), 30, 33, 38, 41.

[16] The most well-known of these is David Kronick who has examined the *Philosophical Transactions* in particular and scientific periodicals in general for most of his career. Kronick, *Scientific & Technical Periodicals*; Kronick, "Toward a Typology of the 17th and 18th Century Scientific and Technical

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Periodical: Part 1-3," *The Serials Librarian* 1 (1977): 385-398, 2 (1977): 67-81, 155-166; Kronick, "Printing History," 243-268.

[17] Katzen, "Changing Appearance," 177-214.

[18] Charles Bazerman, *Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science*, (Madison: University of Wisconsin Press, 1988), 63.

[19] Bryce Allen, Jian Qin, and F.W. Lancaster, "'Persuasive Communities: A Longitudinal Analysis of References in the *Philosophical Transactions* of the Royal Society, 1665-1990," *Social Studies of Science* 24 (1994): 279-310.

[20] This dissertation was later published. R.K. Merton, "Science, Technology and Society in Seventeenth Century England," *Osiris*, 4 (1938): 360-632. Thomas Thompson made an earlier, somewhat limited, attempt to classify the contents of the journal from 1665-1800 as an offshoot of his production of the abridgment of the *Philosophical Transactions*. Thompson, *History of the Royal Society from its institution to the end of the eighteenth century* (1812; xerography facsimile, Ann Arbor: Xerox University Microfilms, 1975).

[21] Although Merton's work was not immediately recognized as important it later came to be so influential that the portion of it dealing with the relationship between science and religion came to be known as the "Merton Thesis." The school of sociology of science that was influenced by this work is called STS in its honour. The rival school that grew up in Edinburgh in response to STS is called the "Strong Programme," Sociology of Scientific Knowledge, or SSK. It main tenets are set out in David Bloor's *Knowledge and Social Imagery*. SSK influenced several scholars, including Steven Shapin, to study the effect of social interests in the development of science. For a good overview of the Merton thesis see: I.B. Cohen, ed., *Puritanism and the Rise of Modern Science: THE MERTON THESIS* (New Brunswick: Rutgers University Press, 1990). On SSK see: David Bloor, *Knowledge and Social Imagery*, 2d ed., (Chicago: University of Chicago Press, 1991).

used in the *Isis* Critical Bibliography.[22] However, the terms used in the bibliography often bear little resemblance to those used by the authors of the articles and this sometimes results in an artificial collection or separation of categories.[23] Unfortunately his analysis was affected both by the technology of the day and the method by which he examined the journal. Confined by the use of 3x5 index cards, Merton assigned each article to only one category. Unfortunately, many of the articles and almost all of the book reviews dealt with more than one topic at a time. The collective effect of this can be quite significant. Merton's analysis was geared towards ascertaining broad trends in interests, "rather than random year-to-year oscillations" and so he chose three-year periods to analyse.[24] Although his approach successfully allowed him to avoid observing ephemeral changes in favour of long-term trends, it obscured other important features of the journal.

When I first began to research this thesis I intended it to be a comparison of the first two scientific journals, the *Philosophical Transactions* and the *Journal des Sçavans*. The *Journal des Sçavans* was of course not a completely scientific journal, but, based on the scientific nature of the articles originating in the *Journal des Sçavans* that were excerpted in the *Philosophical Transactions* in the first two volumes, I believed that it would be possible to compare the contents of the two journals directly. An in-depth examination of the two journals quickly proved that they were very different publications and that their contents were not directly comparable. This interesting discovery led me to ask new questions about why these journals were indeed so different and then to examine the nature of the early scientific and intellectual periodical and the relationship between the journals and the communities they served. In this study I will first describe and compare the scientific communities in England and France and assess how they communicated before the advent of the journal. Then I will carry out an examination of the contents of the *Philosophical Transactions* and the *Journal des Sçavans*. From this analysis I will define the communities served by the respective journals and outline the ways in which the communities interacted with the journals. Finally, I will examine the roles that the journals played in communicating scientific information and discuss what this tells us about the English and French scientific and intellectual communities.

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[22] Merton, "Science, Technology and Society," 403.

[23] For example, the manufacture and use of telescopes was often discussed together in the same article indicating that the authors felt these topics were closely related. According to Merton's methodology and categories, articles dealing predominantly with astronomical observations would appear under "astronomy" while those dealing mainly with the manufacture of telescopes would appear under "technology" leading to a separation of related articles into different categories. An artificial collection of areas of interest occurs in the "Earth Sciences" category. The *Isis* Critical Bibliography groups Geography, Geology, and Meteorology together. However, my research has shown that navigational, terrestrial and atmospheric interests formed large categories in their own right and should not be collected together in this way. See Appendix 2, Analysis of Interests in the *Philosophical Transactions*.

[24] Merton, "Science, Technology and Society," 404.

The approach that I used to examine the contents of the *Philosophical Transactions* and the *Journal des Sçavans* was developed during a preliminary study of the English journal.[25] It is a variation on the approach used by Merton but with some improvements to the basic design that allow a more detailed picture of the seventeenth-century scientific community to emerge. This analysis allows me to delineate the audiences served by the journals; to track changes in areas of interests over time and discern causes for some of those changes; and to follow the discussion and resolution of debates and priority disputes. I have grouped the articles in the journal according to actors' categories, as far as I am able. Each article was read and the title and author, if that could be ascertained, entered into a database. Then several keywords were selected based upon both contemporary and modern subject descriptions.[26] Wherever I could I remained as close as possible to seventeenth-century terminology, allowing for changes in spelling. This study differs from previous examinations of the articles in the *Philosophical Transactions* in that I allowed more than one general area of interest per article. Since several articles discuss diverse phenomena, being able to assign several keywords allows a more representative picture of the variety of interests to be observed. This is particularly true in the case of book reviews in the *Philosophical Transactions* which often reviewed several books at a time.[27] Once the articles had been described by keywords I began to sort the articles according to general areas of interest. General areas of interest were both easy and difficult to assign. In the case of the *Philosophical Transactions*, many of the broader areas of interest were relatively easy to ascertain. Certain articles contained significant overlap between specific areas of interest. This overlap made it clear that they were facets of a more general topic that were being discussed. By searching the database for articles with subject areas in common the boundaries of that general topic could be outlined.[28] In this way I defined the wider groups of "optical interests," "navigation and marine interests," "atmospheric interests," "biological interests," and "terrestrial interests" each of which contain several smaller but related areas of interest. The remaining areas of interest, "chemistry," "mathematics," "medicine," "natural history," "natural philosophy," "instruments," and "crafts" did not share consistent areas of overlap with other areas although there were, of course, examples where a single article dealt with more than one subject. The *Journal des Sçavans* was considerably more difficult to analyse. This was due in no small part to the diverse subject areas contained in the journal. Along with a variety of keywords describing the contents of a particular article, each of the entries for the *Journal des Sçavans* was assigned a broad area of interest to make later analysis easier.[29] These assigned broader areas of interest each contained articles covering a variety of related subjects. This study concentrates on those general areas relating to science or medicine. The journals were then analysed individually and comparatively. The results of this analysis appear in tables in Appendices 1-4. It is from this background that I then began my examination of the *Journal des Sçavans* and the *Philosophical Transactions*.

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[25] Judith Friedman, "Analysing the *Philosophical Transactions*: A New Approach to the Study of Seventeenth-Century Science," (Honours Paper, University of Alberta, 1995). This study discussed how different approaches to the study of the *Philosophical Transactions* could result in quite different conclusions. I contrasted Merton's analysis of the *Philosophical Transactions* with my own and showed how a different approach to the journal could reveal new information about the seventeenth-century scientific community.

[26] The subject area "optics" represents a contemporary area of interest. The term "opticks" was often used in articles discussing astronomy, microscopy, lens production for both activities and optical theory. "Barometer" and "meteorology" represent modern subject descriptions applied to their seventeenth-century equivalents for ease of use and understanding. Several experiments with what we now call mercury barometers were described in journal articles. The apparatus was referred to by a variety of names, weather glass, Torricellian apparatus, barometer etc. Since theses were all variations on the modern barometer, I selected that as the generic term for these objects. In a related fashion, I chose to use the modern term "meteorology" to describe articles interested in the study of the weather or weather phenomenon even though that term was not by the authors themselves. Other examples of such modern terms include "microscopy," "oceanography," "geology," "volcanism," and "fossils."

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[27] For book review articles I selected as many keywords necessary to describe the contents of each of the books as described in the journal.

[28] For example, in the wider area of "optical interests" there are several articles that dealt with optical lenses and optical theory and either microscopy or astronomy as well as articles dealing solely with optics or with microscopic or astronomical observations. In this case a wider interest in optics serves as a bridge between two specialized areas of interest that might from a twentieth-century point of view appear to be quite different but that were in fact treated as related fields by seventeenth-century natural philosophers.

Chapter 1 defines and outlines the nature of the scientific communities in England and France just before the advent of the journals. Although much of this discussion is based upon secondary material, previous studies of scientific society in England and France have tended to concentrate on one or the other. This means that a comparative study of the two groups has not been made and the nature of previous examinations has often obscured the international aspects of European intellectual life. This chapter assesses the differences in composition and organization of English and French scientific society. It also discusses the ways in which scientific information was conveyed within and between members of the various groups. It was because members of the English and French scientific communities perceived these modes of communication as inadequate to their needs that the *Journal des Sçavans* and the *Philosophical Transactions* were created.

Chapter 2 examines the *Philosophical Transactions*. First its history, foundation, and ambiguous relationship with the Royal Society is considered. Then the analysis of the contents of the journal are used to describe the community represented and served by the journal. The interactions between the *Philosophical Transactions* and its readers are revealed by an analysis of the areas of interest seen in the journal. The ways in which the interests of the community affected the contents of the journal and, in turn, the way that the journal helped to guide the interests of the community are examined. Most importantly, the way that Henry Oldenburg, as editor, guided the development of the *Philosophical Transactions* is discussed. Oldenburg actively encouraged scholars to publish their work in his journal by ensuring that they received credit for their work. He deliberately chose to use the *Philosophical Transactions* to publicize debates that were being carried out between members of the community and to help resolve them. He also encouraged the use of the journal as a place in which to establish and defend priority of discovery. Oldenburg's involvement in, and publication of, controversial issues not only helped increase the circulation of the journal, but also had the more important affect of making the journal an active forum for the communication and exchange of scientific views.

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[29] These broad areas of interest included such areas as historical, instructional articles, legal articles, literary articles etc.

The *Journal des Sçavans* is examined in Chapter 3. Its history, creation, suppression and what this reveals about the interesting relationship that the *Journal des Sçavans* had with the French Crown are discussed. The ways in which the plans for the journal changed significantly before its publication and then remained the same following the suppression and change in editors tell us a great deal about what the French intellectual community wanted in a journal and that this journal met those needs. The analysis of the contents of the *Journal des Sçavans* hints at the composition of the readership of the journal and reveals their wide-ranging interests. The relationship between the journal and the French natural philosophical community, their reception of the *Journal des Sçavans*, and the use they made of the journal is examined. The *Journal des Sçavans* was never designed to be a forum for the French scientific or intellectual communities; nor did it develop into one. It was created to be a source of reviews of new literature published in a wide variety of fields and of other news and that is what it remained.

Chapter 4 examines a debate that took place within the two journals and what this can tell us about the readership of the journals and the rules that were being developed to govern scientific discourse in England and in France. This dispute took place between the mathematicians Christiaan Huygens and James Gregory and concerned Huygens' review of Gregory's book. I explore the evolution of the debate in both the public forums of the *Journal des Sçavans* and the *Philosophical Transactions* and in the more private realm of Huygens', Gregory's, and Oldenburg's correspondence. This approach allows us to see how the English and French scientific communities assessed and arbitrated this debate between two scholars. It reveals that general rules governing the civility of printed disputation existed in England and France. Contravening these rules could result in censure by members of the scientific community. However, the rigour with which these rules were applied depended on the social standing of the combatants. The Gregory-Huygens dispute serves as an excellent case study with which to examine the rules which the English and French scientific communities were developing to govern printed scientific discourse. It also illustrates the fact that within five years of the first publication of these journals, members of the English and French scientific communities had sufficient access to the contents of both journals that a debate could be undertaken in which the parties involved could publish their views in one journal or the other without the editors needing to reprint articles containing the other side of the debate.

I conclude by discussing why the *Philosophical Transactions* and the *Journal des Sçavans* were such different journals. The creation, control, goals, nature, format, audience, and contents of the journals are compared and the way that they were used by their readers is analysed. The *Philosophical Transactions* and the *Journal des Sçavans* were created to serve two very different communities; the *Philosophical Transactions* served a British and international community of natural philosophers while the *Journal des Sçavans* served a broader section of the intellectual community with more general interests but was essentially restricted to Paris. The two journals were affected by different governmental and social constraints. The format and content of the *Philosophical Transactions* and the *Journal des Sçavans* were tailored by their editors to suit their readership. The success of these journals and their long existence in the same format shows that both of the journals successfully met the needs of their communities.

As this thesis will show, a great deal can be learned about seventeenth-century scientific communities and communication from studying these journals. The *Journal des Sçavans* and the *Philosophical Transactions* were both created to convey 'solid and usefull knowledge' to their readers. However, the audiences that these journals served defined such knowledge quite differently and the formats of the journals reflect this. From editorial comments and the authorship of articles in the journals, we can discern who the readers of the journals were and gain a better understanding of the membership of the scientific community. Analysing the contents of these journals, particularly the *Philosophical Transactions*, reveals the interests of seventeenth-century natural philosophers and allows us to observe their change over time in response to external and internal factors. We can also study the development of the scientific journal as a forum for the communication of scientific information and the rules that were being developed to govern printed debates and priority disputes.

Chapter 1:
Scientific Societies and Communication to 1665

The *Philosophical Transactions* and the *Journal des Sçavans* reflect the communities that created them. By the middle of the seventeenth century natural philosophical society in France and England had developed along very different lines. Despite these differences, the two groups maintained reasonably close ties with one another through correspondence and travel. Scientific information was transmitted in similar ways in these two countries, through correspondence and print. However, these means of communication were beginning to be perceived as limited and plans for the creation of a journal in which scientific material could be published were beginning to be discussed in both countries by 1663.[1]

One of the most difficult aspects of studying the seventeenth-century scientific community is defining that community. Although the group of men engaged in the study of the new philosophy is commonly referred to as the scientific community, the actual composition of that group remains something of a mystery. Only the broadest outlines of the group have been discovered. The memberships of the scientific societies of the seventeenth century have been somewhat better studied, but there are serious gaps in the documentary record, particularly in France. Even though historians know more about these men, we must remember that the members of these societies do not constitute the whole community, nor do they accurately represent the nature or composition of that broader group.

Several attempts have been made to discern the membership of the English scientific community, beginning with Merton's 1938 article "Science, Technology and Society in Seventeenth Century England."[2] However, most of these studies have concentrated on those natural philosophers who were involved in the creation of the Royal Society.[3] The general consensus is that the members of the seventeenth-century English scientific community were educated men of upper-middle class or higher backgrounds who developed an interest in natural or experimental philosophy either through their university studies or through their work, most commonly in the medical field.[4] Autodidacts or members of the upper merchant class could also become members of the Royal Society, but this was a reasonably rare occurrence.[5]

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[1] Raymond Birn, "Le Journal des Savants sous l'Ancien Régime," *Journal des Savants* (1965): 16; Brown, "History," 366-368; Katzen, "Changing Appearance," 184; Kronick, "Printing History," 224; Morgan, *Histoire*, 43-45; C.-A. Sainte-Beuve, *Causeries du Lundi*, 3d ed., vol. 8, (Paris: Garnier Frères, 1855-1869), 226-228; Charles R. Weld, *A History of the Royal Society from its institution to the end of the eighteenth century*, 2 vols., (London: John W. Parker, 1848), vol. 1, 148-149.

[2] Merton analyzed the contents of the D.N.B. according to "initial interests" based upon education and employment in order to help reveal why the sciences and technology flourished in England in the seventeenth century. Merton, "Science, Technology and Society," 367-396. A more recent in-depth study of the seventeenth-century English scientific community was carried out by Charles Webster. Webster, *The Great Instauration: Science, Medicine and Reform 1626-1660* (New York: Holmes &

The composition of the seventeenth-century French scientific community has been considerably less well examined than the English community. Recent scholarship has concentrated on the study of the governmentally institutionalized academies and has for the most part ignored the earlier, private, institutions. Because

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Meier Publishers, 1975). Occasionally a particular subset of the community is closely examined. For example see: R.G. Frank Jr., *Harvey and the Oxford Physiologists: Scientific Ideas and Social Interaction* (Berkeley: University of California Press, 1980), 43-89. More general examinations of the development of the scientific community have also been carried out. See for example: Michael Hunter, *Science and Society in Restoration England* (Cambridge: Cambridge University Press), 59-86; W.E. Houghton, "The English Virtuoso in the seventeenth century," *The Journal of the History of Ideas* 3 (1942): 51-73, 190-219; Barbara Shapiro and R.G. Frank, Jr., *English Scientific Virtuosi in the 16th and 17th centuries* (Los Angeles: William Andrews Clark Memorial Library, 1979).

[3] See for example: E.S. de Beer, "The Earliest Fellows of the Royal Society," *Notes and Records of the Royal Society of London* 7 (1950): 172-192; Frank, "Institutional Structure and Scientific Activity in the Early Royal Society," *Proceedings of the 14th Congress of the History of Science* 4 (1974-1975): 83-89; Lotte Mulligan and Glenn Mulligan, "Reconstructing Restoration Science: Styles of Leadership and Social Composition of the Early Royal Society," *Social Studies of Science* 11 (1981): 327-364. The most exhaustive study of the membership of the Royal Society was carried out by Michael Hunter. Michael Hunter, *The Royal Society and Its Fellows 1660-1700: The Morphology of an Early Scientific Institution*, 2d ed., British Society for the History of Science (Oxford: The Alden Press, 1994).

[4] For discussions of the English education system and its relationship in fostering interests in the field of science and medicine see: Phyllis Allen, "Scientific Studies in the English Universities of the Seventeenth Century," *Journal of the History of Ideas* 10 (1949): 219-253; John Gascoigne, "The Universities and the Scientific Revolution: The Case of Newton and Restoration Cambridge," *History of Science* 23 (1985): 391-434; Frank, "Science, Medicine and the Universities of Early Modern England: Background and Sources," *History of Science* 11 (1973): 194-216, 239-269; Frank, *Oxford Physiologists*, 45-51; Christopher Hill, *Intellectual Origins of the English Revolution* (Oxford: Clarendon Press, 1965), 14-84, 301-314; Hunter, *Science and Society*, 136-161; Barbara Shapiro, "The Universities and Science in Seventeenth-Century England," *Journal of British Studies* 10 (1971): 47-82; Charles Webster, ed., *The Intellectual Revolution of the Seventeenth Century*, Past and Present Series (London: Routledge & Kegan Paul, 1974); Webster, *Great Instauration*, 100-245.

[5] Merchants and tradesmen made up only 3% of the Royal Society's members between 1660-1664, the smallest of all of the known occupational groups. They formed only 4% of the members elected from 1665-9 (equal with the number of lawyers and just ahead of the civil servants). A number of them were reasonably active in the doings of the Society. Hunter, *The Royal Society*, 126-8. On autodidacts see: Hunter, *Science and Society*, 61-62.

of this, I have been more reliant on earlier studies in my discussion of the early scientific societies than I would otherwise have preferred. Like the English studies, scholarly examination of the French scientific community has tended to concentrate on the salons or académies that formed during the middle of the century and to center on the formation and functioning of the Académie des Sciences rather than attempting to ascertain the general outline of the broader scientific community. As was the case in England, the scientific community in France appears to have been composed of educated men from a wide variety of backgrounds who were introduced to natural philosophy during their education in universities, colleges, and medical schools and were engaged in careers in such fields as law, finance, government, religion and politics.[6]

However, differences did exist between the English and French natural philosophical communities. The French scientific community was drawn from a smaller segment of society than was England's. In part this was due to the fact that, unlike the situation in England, the actual number of people interested in natural philosophy remained quite small.[7] One of the most significant differences was that the French nobility were not as interested in natural philosophy as their English counterparts and very few were involved in those académies or salons which dealt that these topics.[8] In addition, merchants do not appear to have been members of the

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[6] On education see: L.W.B Brockliss, *French Higher Education in the Seventeenth and Eighteenth Centuries: A Cultural History* (Oxford: Clarendon Press, 1987),338-445, 452-2; Brockliss, "The Scientific Revolution in France," in *The Scientific Revolution in National Context*, eds. R. Porter and M. Teich (Cambridge: Cambridge University Press, 1992), 59-61; Roger Chartier, Julia Dominique, and Marie Madeleine Compère, *L'Éducation en France du XVI*^{e} *au XVIII*^{e} *Siècle* (Paris: Socété D'Édition D'Enseignement Supérieur, 1976); David Sturdy, *Science and Social Status: The Members of the Académie des Sciences, 1666-1750* (Woodbridge: The Boydell Press, 1995), 11-13. For discussion of the wide variety of members of the académies see: E. Fauré-Fremiet, "Les Origines de l'Académie des Sciences de Paris," *Notes and Records of the Royal Society of London* 20 (1966): 27-28; David Sturdy, *Science and Social Status*, 13. The most extensive discussion of the membership of non-Académie des Sciences groups continues to be in the early work done by Brown. Brown, *Scientific Organizations*, 87, 163-164, 166-168.

[7] Brockliss, "Scientific Revolution," 55, 61.

[8] Unlike many of their English counterparts, the *noblesse d'épée* did not often receive a comprehensive education in the humanities, let alone in philosophy, and they were generally disinterested in questions concerning the new philosophy. However, in England, aristocrats formed 16% of all Fellows elected to the Royal Society in 1660-1664 and 22% of those elected between 1665 and 1669. Several of them were even active participants in the Royal Society. *Ibid.*, 55, 60-61; Hunter, *Royal Society*, 126-128.

French scientific community, even to the small extent that they were in England.[9] As in England, the community also included provincials and foreigners who not infrequently attended meetings while in Paris.[10] Unlike England, where small groups of natural philosophers existed around the universities in Oxford and Cambridge, French scientific society appears to have been mainly centered in académies in the capital.[11] Before the creation of the Académie des Sciences in 1666 the general nature of the French scientific societies was scientifically and socially heterogeneous and the abilities and social standing of their members varied considerably. The English scientific community was even more socially diverse, including more members from the nobility and merchant class than did the French community. Although interest in the new philosophy was increasing among the members of the French Republic of Letters it often took a back seat to discussions of politics, religion, and literature.[12] In England people turned towards the new philosophy in part to avoid the questions of politics and religion that had consumed the country during the Civil War.[13]

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[9] Brown, *Scientific Organizations*, 87, 163-164, 166-168; Fauré-Fremiet, "Les Origines," 27-28; Sturdy, *Science and Social Status*, 13.

[10] Brown, *Scientific Organizations*, 163-4, 166-8; Fauré-Fremiet, "Les Origines," 27-28.

[11] French provincial scientific life has been almost completely ignored by historians, with the exception of David Lux's work on the académie at Caen. While it is not unreasonable to assume that there were several more scientific enclaves located in the provinces of France which still remain to be examined, they did not play as vibrant or significant a role in the French scientific community as did their English counterparts. A comprehensive study of English scientific life outside London is also needed. David Lux, *Patronage and Royal Science in Seventeenth-Century France: The Académie de Physique in Caen* (Ithica: Cornell University Press, 1989).

[12] The concept of the Republic of Letters is itself rather poorly defined. As used by historians the term "Republic of Letters" generally describes the French-reading public. See Elizabeth Eisenstein, *The Printing Press as an Agent of Change: Communications and cultural transformations in early-modern Europe*, 2 vols. (Cambridge: Cambridge University Press, 1979), 136-140 esp. notes 287 and 289. As used in this thesis, the term "Republic of Letters" refers to Sallo's and Gallois' understanding of the community. They used the terms "Republic of Letters" and "Empire of Letters" interchangeably to refer to a group of educated men with a wide variety of interests capable of reading both French and Latin whom they called "men of letters." For more details see the discussion in chapter 3.

[13] The relationship between religion, politics, the Civil War, and science in seventeenth-century England has been well studied. Cohen, *Puritanism*; Thomas Gieryn, "Distancing Science from Religion in Seventeenth-Century England, *Isis*, 79 (1988): 582-593; Hunter, *Science and Society*, 8-31, 113-135, 162-187; Hunter and P.B. Wood, "Towards Solomon's House: Royal Strategies for Reforming the Royal Society," *History of Science* 24 (1986): 49-108; Merton, "Science, Technology and Society," 414-495; Merton, *Science Technology and Society in Seventeenth Century England* (New York: Howard Fertig, 1993), xi, 266-272; Shapin, "Understanding the Merton Thesis," *Isis* 79 (1988): 594-605; Shapiro, "Early Modern Intellectual Life: Humanism, Religion and Science in Seventeenth Century

Even though the composition of the scientific communities in England and in France were generally similar, by the middle of the seventeenth century these two groups were developing along different paths. However, ties were maintained between the two communities of natural philosophers through correspondence and the not infrequent travel of individuals from one country to another. In England several scientific societies formed during the Civil War period. The immediate predecessors of the Royal Society, the Oxford Society and the group meeting at Gresham College, held organized meetings which concentrated on questions of natural philosophy and generally excluded religious and political topics.[14] By 1665 in England the main scientific society was the Royal Society, founded in 1660 and chartered in 1662. The history of the Royal Society has been so extensively studied, by both Fellows of the Society and historians, that there is no need to detail it here.[15] Despite its charter and title, the Royal Society received no support from the Crown

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England," *History of Science* 29 (1991): 45-71; Webster, ed., *Intellectual Revolution*; Webster, *Great Instauration*. For a general overview of the complexities involved in examining this period see John Henry, "The Scientific Revolution in England," in *Scientific Revolution*, 178-209.

[14] Hill, *Intellectual Origins*, 14-84; Francis B. Johnson, "Gresham College: Precursor of the Royal Society," *Journal of the History of Ideas* 1 (1940): 413-438; Hunter, *Science and Society*, 8-31; R. H. Syfret, "Origins of the Royal Society," *Notes and Records of the Royal Society of London* 5 (1948): 75-137; Douglas McKie, "The Origins and Foundation of the Royal Society of London," *Notes and Records of the Royal Society of London* 15 (1960): 1-37; Webster, *Great Instauration*, 32-99, 484-520; P. M. Rattansi, "The Intellectual Origins of the Royal Society" in *Seventeenth-Century Natural Scientists*, ed. and introduction by Vere Chappell (New York: Garland Publishing, Inc., 1992), 49-63.

[15] The Royal Society published its first official history a mere seven years after its creation. Since that time several other histories have been written by Fellows of the Society or at its request. Thomas Sprat, *History of the Royal Society* (London: Martyn and Allestry, 1667; reprint, ed. J.I. Cope and H.W. Jones, St. Louis: Washington University Studies, 1959); Thomas Birch, *The History of the Royal Society of London for the improving of natural knowledge from its first rise*, 4 vols. (1756-1757; facsimile reprint, introduction by A.R. Hall and biographical note by M.B. Hall New York: Johnson Reprint Corporation, 1968); Thompson, *History*; Weld, *History*; Sir Henry Lyons, *The Royal Society 1660-1940: A History of its administration under its Charters* (Cambridge: Cambridge University Press, 1944); Sir Harold Hartley, *The Royal Society Its Origins and Founders* (London: The Royal Society, 1960); Margery Purver and E.J. Bowen, *The Beginning of the Royal Society* (Oxford: Clarendon Press, 1960). Modern studies of the Royal Society are too numerous to list here. However, four scholars stand out as among the most prolific of the twentieth-century historians. A.R. Hall and M.B. Hall have studied a variety of aspects of the history of the Royal Society and especially the correspondence of Henry Oldenburg. Michael Hunter has concentrated on questions relating to the institutionalization of the early Royal Society. Steven Shapin on his own and in cooperation with Simon Schaffer has examined social aspects of the Society. See especially: Henry Oldenburg, *The Correspondence of Henry Oldenburg*, ed., trans., and introductions by A.R. Hall and M.B. Hall, 13 vols. (Madison: University of Wisconsin Press; London: Mansell; London: Taylor & Francis, 1965-1986). M.B. Hall, *Experimental Learning*; Hunter, *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge: Boydell Press, 1989); Shapin, *Social History*.

and essentially remained a private institution funded by the subscriptions of its fellows. The Royal Society dealt only with natural philosophy and eschewed questions of politics and religion although its critics still accused it of subversive activities.[16] In its activities the Royal Society favoured and encouraged experimentation and the communication of scientific knowledge.[17] Membership was based upon election or appointment and did not necessarily require more than a basic interest in science.[18] The active membership however, consisted of a small, continuously shifting group of highly educated men from within a much larger group who were moderately interested in natural philosophy.[19] Although the Royal Society was centered in London, several of its members lived or taught in Oxford, Cambridge or in other areas of Britain. These members often kept in contact with the Society through correspondence either with the Secretary or with other members.[20] Outside of the Royal Society there was another much larger group of individuals interested in natural philosophy. They shared a similar, if less elaborate, education with the elite and were most often members of the educated gentry, including members of the clergy and their children.[21] Tellingly, these two groups, the more professional and productive scientists and the enthusiasts, were both referred to in the seventeenth century by the term, "virtuosi."[22] These gentlemen maintained contact with the rest of the community through correspondence with Oldenburg or other members of the Royal Society.[23]

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[16] R. H. Syfret, "Some Early Reactions to the Royal Society," *Notes and Records of the Royal Society of London* 7 (1950): 207-258; R. H. Syfret, "Some Early Critics of the Royal Society," *Notes and Records of the Royal Society of London* 8 (1950): 20-64; P.B. Wood, "Methodology and Apologetics: Thomas Sprat's *History of the Royal Society*," *The British Journal for the History of Science* 13 (1980): 4-10.

[17] On experimentation see: M.B. Hall, *Experimental Learning*, 9-65; Hunter, *Establishing the New Science*, 261-338; Hunter and Wood, "Solomon's House," 49-108; Stephen Pumfrey, "Ideas Above His Station: A Social Study of Hooke's Curatorship of Experiments," *History of Science* 29 (1991): 1-44; Shapin, "House of Experiment," 373-404. On communication see: M.B. Hall, "Oldenburg and the Art of Scientific Communication," *The British Journal for the History of Science* 2 (1965): 277-290; M.B. Hall, "The Royal Society's Role in the Diffusion of Information in the Seventeenth Century," *Notes and Records of the Royal Society of London* 29 (1975): 173-192; M.B. Hall, *Experimental Learning*, 58-63; Hunter, Michael. "Promoting the New Science: Henry Oldenburg and the Early Royal Society." *History of Science* 26 (1988): 165-181; Charles Rivington, "Early Printers to the Royal Society," *Notes and Records of the Royal Society of London* 39 (1984): 1-28.

[18] Hunter, *The Royal Society*, 61-71, 123, 134-187; Hunter, *Science and Society*, 70-73.

[19] Hunter, *The Royal Society*, 52; Hunter, *Science and Society*, 44-51, 70-80.

[20] See Hunter, *The Royal Society*, 134-187.

[21] Hunter, *Science and Society*, 76-79.

[22] Houghton, "The English Virtuoso," 51-73, 190-219; *Ibid.*, 63-80; Shapin, *Social History*, 42-64.

The French scientific community was in a considerable state of flux in the middle of the seventeenth century. Scientific and social life in Paris was centred on a circuit of salons or académies. Meetings dealing with scientific topics were held in a handful of locations. The Montmor academy, considered to be the successor to the Mersenne circle, met from 1654 until June, 1664.[24] The academy was interested in experimental philosophy and maintained strong ties through correspondence and visitation with like-minded individuals from the provinces and abroad.[25] The Montmor academy was plagued from its inception with in-fighting and problems with members discussing non-scientific topics at its meetings.[26] Despite having rules drawn up to govern the subject matter and behaviour allowed at the meetings these problems persisted, eventually causing the academy to close.[27] One of the more serious natural philosophy salons was opened in 1663 by Melchisédec Thévenot.[28] However, despite the work being done by its members, Thévenot closed his academy in March 1666 after receiving news of the creation of the Académie des Sciences.[29] Two other académies that discussed questions of natural philosophy opened in 1664 and were run by Henry Justel and the Abbé Bourdelot.[30] A wide variety of topics were discussed at the meetings of these académies including politics, new books, literature, general news, and new discoveries in the arts and sciences.[31] However, whatever discussion of natural philosophy took place at these meetings did not concentrate on the experimental side of the new philosophy. Experiments were not conducted at Justel's salon and those that were conducted at Bourdelot's academy were not well-regarded by the more serious natural philosophers.[32] However, this lack of experimentation does not accurately reflect the interests of the Parisian natural philosophers, as the circumstances surrounding the creation of the Académie des Sciences show.[33]

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[23] Oldenburg's correspondence contains many letters from Englishmen who were not members of the Royal Society. Other members of the Royal Society also played a similar role. Hunter, *Science and Society*, 64-65.

[24] Brown, *Scientific Organizations*, 66-70, 133; Peter Dear, *Mersenne and the Learning of the Schools* (Ithaca: Cornell University Press, 1988), 201-222; Fauré-Fremiet, "Les Origines," 26; Sturdy, *Science and Social Status*, 17.

[25] Brown, *Scientific Organizations*, 76, 119-123.

[26] George, "The Genesis of the Académie des Sciences," *Annals of Science* 3 (1938): 374.

[27] Brown, *Scientific Organizations*, 75-76, 124-126, 133; *Ibid.*, 374; Sturdy, *Science and Social Status*, 18.

[28] Brown, *Scientific Organizations*, 135-136; Fauré-Fremiet, "Les Origines," 28; George, "Genesis," 375.

[29] Brown places the end of Thévenot's academy by 1665 and George places it in the fall of 1664 when Thévenot left Paris for the country. However, as part of his research into the Académie de Physique in Caen, David Lux discovered that Thévenot's group continued meeting until after the creation of the Académie des Sciences and served as an important conduit for the transmission of scientific information from Paris to the regions. Brown, *Scientific Organizations*, 136; George, "Genesis," 375; Lux, *Patronage*, 5-6, 51-56.

[30] Brown, *Scientific Organizations*, 162, 180, 233; George, "Genesis," 376.

A number of natural philosophers had been petitioning Colbert and Louis XIV since 1663 for royal protection and support for an academy with a twofold program for the advancement of science. The philosophers first desired a source of steady funding that would enable them to use demonstration and experiment rather than rhetoric to display scientific information. Achieving this funding would allow the creation of a class of individuals who could devote themselves to full-time philosophical studies.[34] However, these requests for aid were ignored despite Colbert's evident interest in the creation of a royal academy for the study of the arts and sciences.[35] After these first requests went unheard serious lobbying of the Crown by the scientific community began in 1664 and continued into the early months of 1665.[36]

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[31] Brown, *Scientific Organizations*, 168-170, 234-7; George, "Genesis," 376.

[32] George, "Genesis," 376; Brown, *Scientific Organizations*, 168-170, 224, 234-237.

[33] Although the Académie des Sciences was formed after the first publication of the *Journal des Sçavans*, I am including a brief discussion of the creation of the Académie des Sciences here both because of the presumed close ties between the *Journal des Sçavans* and the Académie and because of the effect of the Académie on the Parisian scientific community which will be discussed more fully in chapter 3.

[34] Sturdy, *Science and Social Status*, 69.

[35] John Hirschfield, "The Academie Royale des Sciences (1666-83): Inauguration and Initial Problems of Method" (Ph.D. diss., University of Chicago, 1957), 2-4; George, "Genesis," 377.

[36] This lobbying was extensive. In 1664 Adrien Auzout devoted one third of his *L'Ephéméride du comète*, which he presented to the king in a private audience, to a letter begging him to support the creation of a company of the sciences and the arts already under consideration and the creation of a royal observatory for the glory of the king and the realm. Huygens received a letter in late 1664 or early 1665 detailing a "Project de la Compagnie des Science et des Arts" which would study all of the sciences and the arts for the greater benefit of France. The author of this epistle remains unknown but it has been suggested by Hirschfield that a member or members of the Montmor or Thévenot academies were responsible. Finally, before leaving Paris in 1665 Thévenot too wrote to Colbert seeking royal

In 1665 Colbert began to take action on the subject of royal support for natural philosophy. He instructed Carcavi to begin negotiation to entice Huygens to move to Paris, offering him a generous pension.[37] He also requested that the Petite Académie make suggestions for a new academy of the arts and sciences.[38] Colbert very much approved of these ideas. He wanted the Crown to become the regulator and patron of the Republic of letters and saw the bureaucratic institutionalization of members of the community in various academies as a way to meet these goals.[39] However, these original designs met with opposition from a number of areas.[40] This opposition successfully prevented the creation of a far-reaching academy and all that remained of the original plan was the section devoted to the study of the sciences.[41] Added incentive to create such an academy came from Louis XIV and Colbert's desire to see France outshine all other European states on the field of learning as well as that of battle.[42] The Académie des Sciences had its first meeting in the

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support for a scientific assembly Brown, *Scientific Organizations*, 143-150; George, "Genesis," 377-380; Hirschfield, "Academie," 9-12; Sturdy, *Science and Social Status*, 74.

[37] Hirschfield, "Academie," 13.

[38] The Petite Académie, later known as the Académie Royale des Belles Lettres et Inscriptions, was created in 1663 "to assist Colbert in devising means for enhancing the king's glory." It also advised him on natural philosophy. Charles Perrault, a member of the Petite Académie, early in 1666 drew up plans for a comprehensive academy with four sections studying belles-lettres, history, philosophy and mathematics. As originally planned, this academy would have encroached on other already extant academies, the Académie Française among others, the Sorbonne, the parlement and the faculty of medicine in a fashion that was likely to be controversial, so an alternate plan was drawn up by Chapelain, another member of the Petite Académie, and presented at the same time. Chapelain envisioned the creation of an academy of the arts and sciences which would peacefully reign over the currently existing academies and help to coordinate their activities for the betterment of the state. Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1666-1803* (Berkeley: University of California Press 1971), 12; Hirschfield, "Academie," 2, 14-15, 20; Sturdy, *Science and Social Status*, 69-72.

[39] Hahn, *Anatomy*, 13.

[40] Colbert's attempts to create a broad academy met with strenuous resistance from the Académie Française, the Sorbonne, the faculty of medicine and the Parlement who feared that the creation of this new academy, run under the auspices of Colbert, would threaten their autonomy. The historians who might have become members were threatened with legal action by Parlement if they were to infringe on its rights, those selected from amongst the Académie Française to be members of the new academy began to insist that the work of the older body would serve the interests of literature better than a newer body and opposition against the proposed section dealing with theology was also mounted from within the Sorbonne. Hirschfield, "Academie," 18-20; Sturdy, *Science and Social Status*, 75-76.

[41] Hirschfield, "Academie," 20.

[42] Brown, *Scientific Organizations*, 120; Hahn, *Anatomy*, 14.

Bibliothèque du Roi on December 22, 1666.[43] The status of the Académie des Sciences was ambiguous, perhaps deliberately so, and the fact that the meetings of the Académie were closed to non-members and that its members were pledged to secrecy in exchange for their pensions added to the mystery.[44] This policy of secrecy might have had its roots in an attempt by the Académie to avoid the sort of ridicule suffered by the Royal Society at the hands of its detractors although the desire for priority, fame, and national security are also possible motivating factors.[45] The membership of the Académie des Sciences has been the best studied of all of the seventeenth-century French academies interested in science.[46] The information that can be gained from such studies tells us that the background of the men that made up the Académie was not so different from the members of the Royal Society, except that merchants and nobles were not included, either as practitioners or as observing members. The members of the Académie were selected by Colbert from the Parisian salons and académies.[47] Colbert was eager to use the proposed academy of sciences and arts not only to make new discoveries in the fields of navigation, warfare and architecture but also as part of a planned centralization of intellectual and cultural activities, for the further glory of the king and of France.[48] How active a role Louis XIV played in the creation of the Académie has been debated by historians.[49] Regardless of these differing opinions it is clear that the creation of the Académie fit in with Louis' policy of consolidation of power and patronage in the hands of the Crown in the wake of Louis XIV's personal rule and royal reaction to the Frondes.[50] The creation of the Académie des Sciences was mutually beneficial for the king and the natural philosophers involved. The academicians were willing to devote their research to the benefit of the Crown in exchange for pensions and equipment.[51] In return the king would gain the practical knowledge discovered by such a group and enhance his standing as an enlightened ruler at home and abroad while ensuring the loyalty of this elite group of individuals.[52]

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[43] Hirschfield, "Academie," 20. The Académie des Science has been less well studied than its nearest English counterpart, the Royal Society. Studies of the early Académie are difficult to come by. There was one history written in the eighteenth century and three in the nineteenth. The studies of Hahn, Hirschfield, Stroup and Sturdy form the main body of twentieth-century work on the Académie. For some reason the study of seventeenth-century science does not seem to have greatly interested French scholars. Birembaut, "Les Caractères Originaux de l'Académie Royale des Sciences de 1666 a 1698," in *Actes du 100^e Congrès National des Sociétés Savants Paris, 1975 Section d'histoire moderne et contemporaine et Commission d'histoire des sciences et des techniques: Les Sociétés Savants Leur Histoire* (Paris: Bibliothèque Nationale, 1976), 7-11; Hahn, *Anatomy*; Hirschfield, *"Academie,"*; Stroup, *A Company of Scientists: Botany, Patronage, and Community at the Seventeenth-Century Parisian Royal Academy of Sciences* (Berkeley: University of California Press, 1990); Sturdy, *Science and Social Status*.

[44] The Académie des Sciences was a consultative body and not a corporation. There were no written or legislative orders for its existence signed by the king or enacted by Parlement. However, a medal was struck in its honor indicating some sort of acknowledgment of its existence. The Académie remained an informal institution for quite some time; it did not receive royal letters-patent formally acknowledging its existence until 1713. Indeed, in its early years, the Académie itself existed without a proper title. It was referred to as the 'company that met in the King's library' in the *Journal des Sçavans*, but called the "Académie Royale des Sciences" in the royal household accounts. It was not until 1699 that it officially received the appellation "Académie Royale" from Louis XIV. Its creation was also exceedingly quiet and secretive; even members of the Académie did not know its composition or policies before the group began meeting. Fauré-Fremiet, "Les Origines," 20; .Hahn, *Anatomy*, 4-5.; Hirschfield, "Academie," 1, 20-21; Lux, *Patronage*, 51-53; Stroup, *Company*, 199-200, 205.

[45] Stroup, *Company*, 205-210.

[46] The composition of the early Académie has been extensively studied by Stroup and Sturdy and less extensively by Brown. Brown, *Scientific Organizations*, 117; Hahn, "Scientific Research as an Occupation in Eighteenth-Century Paris," *Minerva* 13 (1975): 501-513; Hahn, "Scientific Careers in Eighteenth-Century France," in *The Emergence of Science in Western Europe*, ed., M. Crosland, (New York: Science History Publications, 1976), 127-138; James McClellan, "The Académie Royale des Sciences, 1669-1793: A Statistical Portrait," *Isis* 72 (1981): 541-567; Lewis Peynson, "'Who the Guys

In England by 1665 communities of natural philosophers had formed in Cambridge, Oxford, and London. These groups held meetings that were generally private and concentrated very narrowly on examining questions in natural philosophy.

Were': Prosopography in the History of Science," *History of Science* 15 (1977): 155-188; Stroup, *Company*, 16-17; Sturdy, *Science and Social Status*, 78-100, 110-137.

[47] Most of the members appear to have been chosen on the basis of practicality. The role that religious affiliation played in the selection process remains an open question. Hahn and Sturdy believe that Colbert avoided selecting those whose religious affiliations might have been an embarrassment while Hirschfield argues that religion played a major role in the selection of the members of the Académie and that those with Jansenist leanings were the ones most likely to be selected. Hahn, *Anatomy*, 11-12, 15; Hirschfield, "Academie," 30-60; Sturdy, *Science and Social Status*, 77, 156-159.

[48] Hahn, *Anatomy*, 9; David Lux, "Patronage in the Age of Absolutism: Royal Academies and State Building Policy in 17th-Century France," *Proceedings of the Annual Meeting of the Western Society for French History* 9 (1982): 85-95; Sturdy, *Science and Social Status*, 160-161.

[49] Hahn believes that Louis XIV played an active role in the science policy followed during his reign. Stroup argues that Colbert was the motivating force behind the creation of the Académie. Hahn, "Louis XIV and Science Policy," in *Sun King: The Ascendancy of French Culture during the Reign of Louis XIV*, ed. David Rubin (Washington: The Folger Shakespeare Library, 1992), 195-203; Stroup, "Louis XIV as Patron of the Parisian Academy of Sciences," in *Sun King*, 224-230.

[50] Sturdy does a good job of tying the creation of the Académies into the social and political scene. Sturdy, *Science and Social Status*, 26-59.

[51] *Ibid.*, 151-156

[52] Hahn, *Anatomy*, 9-10.

In France, on the other hand, the natural philosophical community was one small group in the larger Republic of Letters.[53] The scientific community was more fragmented than in England. It had much broader interests, and discussed natural philosophy along with a wide variety of other topics. Indeed the meetings of Parisian scientific académies were often not scientific but more general and many of these groups shared more in common with the general French literary and political *salons*.[54] Before the creation of the Académie des Sciences those interested in the new philosophy did not form a well-defined community but shifted from group to group according to their own interests and the changing fortunes of the groups themselves.[55]

Scientific societies in both England and France attempted to garner royal support for their activities in the 1660s. However, the response of the monarchs of the two countries was very different and would have lasting repercussions for the future development of science. In England, because the monarch supported the society in name alone and not monetarily, the Royal Society was not able to carry out its early attempts at institutionalization. Instead the Society became a reasonably open group that maintained ties with natural philosophers throughout Europe through an extensive and deliberate policy of correspondence.[56] Because it had managed to secure royal support, the Académie des Sciences had its research directed and its publications and membership controlled by its ministerial overseers, which helped to stifle innovative research.[57] Paradoxically, it seems that by achieving the governmental support it sought that the members of the Parisian scientific community and of the Académie des Sciences actually lost the freedom to pursue research that they had been hoping to gain from that arrangement and the vibrancy of the French scientific community suffered because of it.

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[53] Eisenstein differentiates between the more "learned cosmopolitan Latin-reading 'Commonwealth of Learning' and the more 'worldly' cosmopolitan French-reading 'Republic of Letters.'" *Printing Press*, 137-140 esp. note 289.

[54] Further research into the French scientific scene before the creation of the Académie des Sciences is desperately needed as no study has been attempted since Brown's *Scientific Societies*. Several questions need to be addressed. To what extent may many of these groups be called "scientific" at all? What differentiated these groups between the general *salons*? Did any of the *salons* discuss news of scientific discoveries or was that the dividing line that made these other groups "scientific?" How then do these groups compare with the English Oxford Philosophical Society and the group that met at Gresham college and the later Royal Society whose discussions were primarily philosophical in nature? Considerable research has been done on the literary and political aspects of *salon* life but these studies refer to interests in natural philosophy only tangentially, if at all. See for example: Josephine de Boer, "Men's Literary Circles in Paris 1610-1660," *Publications of the Modern Language Association of America* 53 (1938): 730-739, 762-765.

[55] Hahn, *Anatomy*, 5-7.

[56] For early plans to institutionalize the Royal Society and its early policies see Hunter, "A "College" for the Royal Society: the Abortive Plan of 1667-8," *Notes and Records of the Royal Society of London* 38 (1984): 159-184; Hunter and Wood, "Solomon's House," 49-108; Hunter, "Promoting the New Science," 165-181; Hunter, *Establishing the New Science*, 1-27.

The communication of scientific information in France and in England before the advent of the journal was generally similar.[58] Information was exchanged through correspondence or through the publication and sale of books or printed letters. Correspondence networks were an important method of communication between scientists. Natural philosophers wrote to one another or to individuals who served as communications nexuses by spreading information throughout Europe. Prior to 1650 the Minorite Friar Marin Mersenne played an important role in the development of the French scientific community by organizing an extensive network of correspondents to whom he spread news of new discoveries.[59] Although after Mesenne's death no other individual in France established a correspondence network that rivaled his in size or scope, there were several smaller circles of communication. The secretaries of the Parisian academies often maintained a correspondence with other scientific societies and scientists in France and abroad as did individual members.[60] These ties linked the Parisian scientific community with the broader scientific world and encouraged its own debates and experiments. Henry Justel acted as one such communications nexus, primarily by disseminating news from England to the Continent.[61] However, in spite of its position as the preeminent scientific society in France, the Académie des Sciences played a very small role in scientific communication. Even though it had appointed a member to the position of Secretary, the Académie did not officially communicate its discoveries to members of the Paris community or, despite Fontenelle's belief, to the Royal Society.[62] The Académie des Sciences did carry out an official correspondence with the Académie de Physique in Caen, but only after that academy became a royal corporation.[63] Privately, academicians often continued to attend the meetings of private scientific societies and maintained a correspondence with members of the scientific community abroad; several also held dual memberships with the Royal Society but they had to balance the information exchanged in these contacts with their pledge to maintain the secrecy of the doings of the Académie.[64] Private and institutional correspondence served as the major method of communicating the most novel scientific and technological discoveries before the advent of the journal.

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[57] Hahn, "Louis XIV," 203-204; Stroup, "Louis XIV as Patron," 227-228; Stroup, *Company*, 208.

[58] For a general examination of methods for the communication of scientific information in Europe see Dolby, "Transmission," 1-45.

[59] Dear, *Mersenne*, 239-259. For Mersenne's role as correspondent see also: Brockliss, "Scientific Revolution," 61-62; M.B. Hall, "Oldenburg and Communication," 285.

[60] However, the correspondence carried out by the secretaries of the Académie was limited when compared to that of the Royal Society. Indeed, it was this lack of correspondence to which Martin Lister (F.R.S. 1671) attributed the failure of the Académie's own journal, *Mémoires de Mathematiques et de Physique de l'Académie Royale des Sciences de l'Année 1692 et 93*, that was only published during those two years. Kronick, *Printing History*, 141-143; John Lough, *France Observed in the Seventeenth Century by British Travellers* (Stocksfield, Nothumberland: Oriel Press, 1984), 325-326.

[61] Brown, *Scientific Organizations*, 162-3, 180-4.

The communication of scientific information was somewhat better organized in England than in France, mainly through the activities of the Royal Society and the activities of its secretaries, particularly Henry Oldenburg. The Royal Society perceived the communication and spread of scientific knowledge as an important function of the Society and it appointed two secretaries to carry out this task.[65] In the early years of the Royal Society, several Fellows maintained a correspondence with foreign and provincial philosophers. However, during the 1660s Oldenburg gradually took on the role as the major official correspondent of the Society.[66] In many ways Oldenburg was ideally suited to the role of Secretary; he was multilingual and had maintained ties with individual philosophers and French scientific societies to whom he had been introduced during his European travels between 1653 and 1660.[67]

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[62] Hahn, *Anatomy*, 16-17; Stroup, *Company*, 205; Sturdy, *Science and Social Status*, 162. On Fontenelle's *Histoire de l'Académie Royale des Sciences* see Lux, *Patronage*, 4-7, 54-56; Sturdy, *Science and Social Status*, 145-147.

[63] Lux, *Patronage*, 53; Stroup, *Anatomy*, 205.

[64] Stroup, *Company*, 196-205.

[65] M.B. Hall, "Oldenburg and Communication," 282.

[66] Hunter, "Promoting Science," 167.

[67] For information on Oldenburg's life and role as correspondent see: R.K. Bluhm, "Henry Oldenburg, F.R.S. (*c*. 1615-1677)," *Notes and Records of the Royal Society of London* 15 (1960): 183-184; A.R. Hall and M.B. Hall, "Some Hitherto Unknown Facts About the Private Career of Henry Oldenburg," *Notes and Records of the Royal Society of London* 18 (1963): 94-103; A.R. Hall and M.B. Hall, "Further Notes on Henry Oldenburg," *Notes and Records of the Royal Society of London* 23 (1968):

Oldenburg's correspondence outstripped even that of Mersenne, peaking at 319 letters in 1668 and averaging 250 a year afterwards, dropping below 200 only in 1674 and 1677.[68] The Royal Society's support was instrumental in maintaining this enormous correspondence. The Society not only paid the postage on the letters, an expense greater than most private individuals could bear, but it also used the political influence of some of the Fellows to deliver letters to scholars in Europe.[69] Oldenburg's correspondence network helped to keep the wide-spread members of the Royal Society aware of each other's work and of developments in natural philosophy made elsewhere in England and in Europe. Correspondence, both public and private, was an important means of distributing scientific information in England and France. However, the increasing size of the community was making traditional correspondence untenable and some new means of spreading news was needed.[70]

In both England and France, the publication of letters and monographs was also an important way to spread scientific discoveries. Published letters have received very little scholarly attention.[71] Doubtless such a study would be complicated by the ephemeral nature of the documents involved. Based on the reviews in the *Journal des Sçavans* and the articles in the *Philosophical Transactions*, this was a significant method for transmitting scientific information too small to be published as a book in the period before the journals were firmly established.[72]

33-42; M.B. Hall, "Oldenburg and Communication," 278; John Henry, "The Origins of Modern Science: Henry Oldenburg's Contribution," *The British Journal of the History of Science* 21 (1988): 103-110; Hunter, *The Royal Society*, 80; McKie, "The Arrest and Imprisonment of Henry Oldenburg," *Notes and Records of the Royal Society of London* 6 (1949): 28-47; Oldenburg, *Correspondence*, vol. 1, xxix-xxxi; Shapin, "O Henry," 419. The relationship between Oldenburg's role as Secretary and the creation of the *Philosophical Transactions* will be discussed at the beginning of Chapter 3.

[68] Dear, *Mersenne*, 3; M.B. Hall, "The Royal Society's Role," 168.

[69] M.B. Hall, "The Royal Society's Role," 179-181; Hunter, *Science and Society* 51; Manten, "Growth," 3-4.

[70] Mersenne was the last great French correspondent. Although Oldenburg's correspondence outstripped Mersenne's it could not be equalled by his successors. M.B. Hall, *Promoting Experimental Learning*, 70-1; Hunter, *Science and Society*, 49-51.

[71] M.B. Hall, "Oldenburg and Communication," 284. Often what notice has been taken of these materials has tended to concentrate on those letters which spread political rather than scientific news. Joseph Klaits, *Printed Propaganda Under Louis XIV: Absolute Monarchy and Public Opinion* (Princeton: Princeton University Press, 1976), 39-57.

[72] There were twelve reviews of pieces clearly identified as printed letters, almost all dealing with scientific material, in the first five volumes of the *Journal des Sçavans* and one in the *Philosophical Transactions* during the same period of time. It is unclear how many of the other reviews might also

Before the advent of the journal, scientific books were the main means of transmitting printed scientific information. The number of scientific monographs published in Europe rose steadily throughout the seventeenth century.[73] In France the use of the vernacular as the language of published scientific monographs increased rapidly from the middle of the seventeenth century.[74] English natural philosophers also used the vernacular in their publications but Latin remained important since the English language was not very well known on the Continent.[75] Monograph publication was generally undertaken privately, but the Royal Society also took an active role in publishing the works of its Fellows and others.[76] In contrast to the Royal Society, the Académie des Sciences did not take an active role in publishing the results of the research of the academicians or others and the situation was complicated by the need to get ministerial approval and funding before publication could occur.[77] Besides appearing in printed letters or monographs scientific information was also occasionally published in another early journal. In France, before the creation of the *Journal des Sçavans*, Théophraste Renaudot's *Gazette* sometimes reported on philosophical topics in addition to communicating more general information on religion, politics and news.[78] Although scientific monograph publishing would remain significant well into the nineteenth century, publishing,

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have been of printed letters or of very short books or whether these sorts of printed letters were more common in France than in England.

[73] For an overview of the growth and development of the publication of scientific monographs see David Knight, "The Growth of European Scientific Monograph Publishing before 1850," in *Development of Science Publishing in Europe* A.J. Meadows ed., 23-41, (Amsterdam: Elsevier Science Publishers, 1980)

[74] Brockliss, "Scientific Revolution," 66.

[75] For a brief review on the publication of English scientific monographs see Adrian Johns, "History, Science, and the History of the Book: The Making of Natural Philosophy in Early Modern England," *Publishing History* 30 (1991): 5-30.

[76] M.B. Hall, *Promoting Experimental Learning*, 44-45, 105-107; Hunter *Science and Society*, 45, 49, 56-57; Rivington, "Early Printers," 22-27.

[77] Stroup, *Company*, 208.

[78] Brown, *Scientific Organizations*, 20-21. On Renaudot as the "father of French journalism" see Eisenstein, *Printing Press*, 246-248. The *Gazette* was also consciously used by the Crown as a means of spreading governmental propaganda in Paris and abroad, as was the *Journal des Sçavans* after its creation. Klaits, *Printed Propaganda*, 57-67, 74-77.

transporting, and purchasing scientific books was an expensive and sometimes difficult proposition.[79]

As this chapter has shown, the scientific communities in England and in France were developing along quite different paths in the middle of the seventeenth century. The membership of these communities, as far as they can be discerned, was relatively similar, composed mainly of men from the professional and upper-middle classes, although English scientific society included members both from the upper merchant class and from the nobility who were not generally members of the scientific community in France. These men shared the same general educational background, having some university education, and were often introduced to natural philosophy either in the course of their education or through their work. Several scientific societies had formed in England and in France by the middle of the seventeenth century. In England, scientific societies tended to be more organized and to concentrate their meetings on questions of natural philosophy deliberately excluding questions of religion and politics. In France, in contrast, scientific societies were more closely related in structure and function to other groups formed by the Republic of Letters. Like the larger community of which they were a part, they had reasonably general interests and pursued natural philosophy along with many other topics. Additionally, the nature and structure of the scientific community in Paris was undergoing considerable change during this period with the creation of the Académie des Sciences. Although many members of the English and French scientific communities attended meetings of these societies, either at home or abroad, membership in a scientific society was not a prerequisite for being considered part of the scientific community. Despite the fact that the regional development of the scientific communities in England and France was quite different, it is clear that all of these men considered themselves part of an international group of natural philosophers. Information was disseminated through the scientific community at first hand at the meetings of the various groups, through the publication of printed letters and monographs, and through correspondence. Even though these means had been sufficient for the communication of scientific information in the past, it was becoming clear by 1663 that a new outlet was needed and the format selected was that of the journal. In France, François Eudes de Mézeray applied for and received a privilege to publish such a journal that never made it into press, while in England Robert Hooke had also suggested that a scientific journal be published.[80] Both of these communities succeeded in creating their journals early in 1665 when first the *Journal des Sçavans* and then shortly thereafter the *Philosophical Transactions* began publication, ushering in a new mode of scientific discourse. However, as the following two chapters will illustrate, these two journals were very different and reflected the nature of the communities that created them.

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[79] Publication could be complicated by a number of factors including politics, religion, censorship, finances, war and other natural disasters. Obtaining books published abroad could also be particularly trying. Part of the arrangement that Oldenburg had with Justel was for the exchange of scientific books. Eisenstein, *Printing Press*, 660-682; Anne Goldgar, *Impolite Learning: Conduct and Community in the Republic of Letters 1680-1750* (New Haven: Yale University Press, 1995), 33-34; M.B. Hall, *Experimental Learning*, 44-45, 58-59; Klaits, *Printed Propaganda*, 35-39; Oldenburg, *Correspondence*, vol. 3, xxvi-xxvii; Rivington, "Early Printers," 1-28.

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[80] Birn, "Le Journal," 16; Brown, "History," 366-368; Katzen, "Changing Appearance," 184; Kronick, "Printing History," 224; Sainte-Beuve, *Causeries*, vol. 8, 226-228; Weld, *History*, vol. 1, 148-149.

Chapter 2:
The *Philosophical Transactions*

> Whereas there is nothing more necessary for promoting the improvement of Philosophical Matters, than the communicating to such, as apply their Studies and Endeavours that way, such things as are discovered or put in practise by others; it is therefore thought fit to employ the *Press*, as the most proper way to gratifie those, whose engagement in such Studies, and delight in the advancement of Learning and profitable Discoveries, doth entitle them to the knowledge of what this Kingdom, or other parts of the World, do, from time to time, afford, as well of the progress of the Studies, Labours, and attempts of the Curious and learned in things of this kind, as of their compleat Discoveries and performances.[1]

Henry Oldenburg introduced the first scientific journal to the natural philosophical community with these words on March 6, 1665.[2] As is so often the case with new discoveries, no one, least of all Oldenburg himself, realized how important this new journal would be or that it would usher in a new mode of scientific communication. Indeed, at least one of Oldenburg's correspondents did not view the creation of scientific journals as at all innovative. As Adrien Auzout wrote to Oldenburg on September 23, 1665:

> I see little difference between printing scientific matters contained in letters and showing these same letters to

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[1] Henry Oldenburg, "The Introduction," *Philosophical Transactions* 1 no. 1 (1665): 1-2.

[2] The dating of the issues of the *Philosophical Transactions* is somewhat confusing. While England was still officially following the Old Style Calendar, with the new year beginning on 25 March, the publishers gave a double indication of the date, which was not uncommon after the Restoration. However, the publishers gave this indication in two ways. They dated the front of the journal in the form "Munday, March 6. 1664/5" on the first page and then on the last page, after the publishing information, simply gave the year as if it began on 1 January "1665." Where citing the *Philosophical Transactions* I have made no attempt to correct the dates from Old Style to New Style but have simply given the date as if the new year began on 1 January. To add to the confusion, the years of the journal were counted from the first issue of March, regardless of whether that fell before or after 6 March. Beginning with volume 2 the journal also began a new volume at the beginning of March, so volume 2 actually encompasses the third year of the *Philosophical Transactions*. C.R. Cheney ed., *Handbook of Dates For Students of English History* (Royal Historical Society, 1945; reprint, Cambridge: Cambridge University Press, 1996), 4-5.

> those learned in these matters who can copy them out
> when they have them on loan.[3]

From the very beginning, the *Philosophical Transactions* led an ambiguous existence. Printed under the license of the Royal Society it was nevertheless intended to be the private business of its creator and editor Henry Oldenburg.[4] However, despite these intentions, the *Philosophical Transactions* and the Royal Society remained inextricably bound to one another in the eyes of the reading public through the body of that man-- with interesting results for both parties.[5]

An examination of the contents of the *Philosophical Transactions* will outline the composition and nature of the seventeenth-century scientific community that it served. From the contents of the journal we can learn about both those individuals who read the journal and those who contributed to it. The *Philosophical Transactions* and its audience also interacted with one another. The changing interests of the community are reflected in the journal's contents and articles in the journal in turn helped to direct and shape the interests of its readers. The study of the journal also reveals developments that were occurring in scientific communication. Under Oldenburg's guidance the *Philosophical Transactions* became far more than just "the most proper way to gratifie those" interested in natural philosophy.[6] It became an acceptable place in which to publish, for the first time, news of scientific discoveries and a forum in which to debate issues, and to claim and defend priority of discovery. This analysis of the *Philosophical Transactions* allows us to observe the creation of this new mode of printed scientific discourse and the rules that Oldenburg and the community were creating to govern it.

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[3] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 2, 518.

[4] E.N. da C. Andrade, "The Birth and Early Days of the *Philosophical Transactions*," *Notes and Records of the Royal Society of London* 20 (1965): 13; M.B. Hall, "Oldenburg and Communication," 288; M.B. Hall, *Promoting Experimental Learning*, 59; M.B. Hall, "The Royal Society's Role," 185; W.D.M.P., "Conversazione to Mark the 300th Anniversary of the Publication of the *Philosophical Transactions of the Royal Society*, Hooke's *Micrographia*, and Evelyn's *Sylva*," *Notes and Records of the Royal Society of London* 21(1966): 14.

[5] Andrade, "Birth," 13-14; M.B. Hall, *Promoting Experimental Learning*, 59-60; Kronick, "Printing History," 245-246

[6] Oldenburg, "The Introduction," 1.

From the very beginning, the Royal Society was concerned with the communication of scientific information. At its foundation, the Society created two secretarial positions and the secretaries, particularly Oldenburg, contributed greatly to the communication of information within England and abroad.[7] The Royal Society was also involved in the publication and distribution of scientific books both by its Fellows and by others.[8] Simply keeping foreign colleagues aware of the doings of the Royal Society required a substantial correspondence. According to Robert Moray, the Society seems to have planned as early as 1661 to augment this correspondence with printed material. Moray, one of the founding members of the Royal Society, maintained a correspondence with the Dutch scientist Christiaan Huygens and kept him informed of the activities of the Society.[9] Moray was well aware of the enormity of this task. As he wrote to Huygens in September of 1661:

> Il me feroit impossible de vous informer, par lettre, de toutes les particularitez dont nous nous meslons. Mais Je crois que de temps en temps nous imprimerons ce qui se passe entre nous, au moins tout ce qui se doibt publier. Alors vous en aurez tousiours des Copies des premiers. et s'il y a quelque chose de reserue qu'on ne met point au iour, il me sera alors bien plus facile à vous le communiquer, que de vous faire participant de tout, par lettres.[10]

The first suggestion that the Royal Society was considering creating a periodical-type publication of their work and inquiries came in 1663.[11] A note written by Hooke, dated to 1663 by C.R. Weld, exists in the archives of the Royal Society. This notice reports that the Fellows of the Royal Society:

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[7] Bluhm, "Henry Oldenburg," 183-184; A.R. Hall and M.B. Hall, "Unknown Facts," 94-103; A.R. Hall and M.B. Hall, "Further Notes," 33-42; M.B. Hall, "Oldenburg and Communication," 278, 282; M.B. Hall, "The Royal Society's Role," 179-181; Henry, "Origins," 103-110; Hunter, "Promoting Science," 167; Hunter, *Science and Society*, 51; Hunter, *The Royal Society*, 80; Manten, "Growth," 3-4; McKie, "Arrest and Imprisonment," 28-47; A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 1, xxix-xxxi; Shapin, "O Henry," 419.

[8] M.B. Hall, *Promoting Experimental Learning*, 44-45, 105-107; Hunter *Science and Society*, 45, 49, 56-57; Rivington, "Early Printers," 22-27.

[9] Huygens became a Fellow of the Royal Society in 1663. Hunter, *Royal Society*, 134-135, 162-163.

[10] Christiaan Huygens, *Oeuvres Complètes de Christiaan Huygens*, 22 vols. (La Haye: Martinus Nijhoff, 1888-1950), vol. 3, 317.

[11] Although the fact that Hooke wrote this plan for a "paper of advertisements" is not in doubt, the dating of it to 1663 is in question. Brown believes that the paper should more correctly be dated to the period during which the *Philosophical Transactions* was discontinued after Oldenburg's death. Brown,

> designe to print a Paper of advertisements once every week, or fortnight at furthest, wherein will be contained the heads or substance of the inquiries they are most solicitous about, together with the progress they have made and the information they have received from other hands, together with a short account of such other philosophicall matters as accidentally occur, and a brief discourse of what is new and considerable in their letters from all parts of the world, and what the learned and inquisitive are doing or have done in physick, mathematicks, mechanicks, opticks, astronomy, medicine, chymistry, anatomy, both abroad and at home.[12]

This proposed "Paper of advertisements" never appeared. The idea of creating a periodical was obviously still being considered by members of the Royal Society and in early 1665 the new paper was ready for publication. The minutes of the meeting of the Council of the Royal Society on March 1, 1664/5 order:

> that the *Philosophical Transactions*, to be composed by Mr. Oldenburg, be printed the first Monday of every month, if he have sufficient matter for it, and that the tract be licenced by the council of the society, being first reviewed by some of the members of the same; and that the president be desired now to license the first papers thereof being written in four sheets in folio, to be

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Scientific Organizations, 187 note 2. However, Bluhm and McKie agree with the original date and the position of H.W. Robinson, the expert whom Brown consulted, remains ambiguous. Bluhm, "Henry Oldenburg," 183; Andrade, "Birth," 12. I believe that the earlier date is more likely to be correct. First, it is odd that Hooke would not mention the *Philosophical Transactions* and its popularity if this was an attempt to gain support for his own *Philosophical Collections*. Secondly, the notice that the paper would be published weekly or bi-monthly suggests to me that the paper comes from the earlier period. The *Journal des Sçavans*, which was supposed to be published weekly, never managed to meet this sort of publication deadline. Oldenburg's *Philosophical Transactions* had difficulties making its own intended publication deadline of the first Monday of the month. Hooke would have been well aware in the late 1670s that such frequent publication would have been difficult at best. Indeed, the *Philosophical Collections* were printed irregularly and never approached a weekly or bi-monthly frequency. M.B. Hall, *Promoting Experimental Learning*, 108-109.

[12] As printed in Weld, *History*, vol. 1, 148-149.

> printed by John Martyn and James Allestry printers to the society.[13]

Despite the fact that the *Philosophical Transactions* was printed under the license of the Royal Society, the Royal Society's supervision of the journal was relatively minor and short-lived.[14] The journal was considered Oldenburg's private business and he had originally hoped to augment his income by publishing portions of his correspondence in the *Philosophical Transactions*.[15] However, because the plague of 1665 and the Great Fire of London of 1666 had decimated London's printers, he averaged only about £40 profit per year from his efforts and often complained about the recalcitrance of the printers.[16]

Although both the Council of the Royal Society and Oldenburg understood that the *Philosophical Transactions* was the responsibility of Oldenburg alone, many individuals, both in England and abroad, often confused the issue. This concerned either Oldenburg, the Royal Society, or both, so gravely that Oldenburg published a retraction in issue 12 on May 7, 1666.

> Whereas 'tis taken notice of, that several persons perswade themselves, that these *Philosophical Transactions* are publish't by the *Royal Society* ... The Writer therof hath thought fit, expresly here to declare, that that perswasion, if there be any such indeed, is a meer mistake; and that he, upon his *Private* account ... hath begun and continues both the composure and publication thereof: Though he denies not, but that, having the honour and advantage of being a *Fellow* of the said *Society*, he inserts at times some of the Particulars that are presented to them; ... tending only to administer occasion to others also, to consider and carry

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[13] Andrade, "Birth," 13; M.B. Hall, "The Royal Society's Role," 185.

[14] For example, other members of the Royal Society saw to the publication of the *Philosophical Transactions* in Oxford during the plague. One of the few cases where the Society directly interfered with the publication of the journal will examined in chapter 4. M.B. Hall, *Promoting Experimental Learning*, 59.

[15] Andrade, "Birth," 13; M.B. Hall, "Oldenburg and Communication," 288; M.B. Hall, *Promoting Experimental Learning*, 59; M.B. Hall, "The Royal Society's Role," 185; W.D.M.P., "Conversazione," 14.

[16] Andrade, "Birth," 13-16; Hall, "Oldenburg and Communication," 288; Rivington, "Early Printers," 4-7

> them further, or to Observe or Experiment the like, according as the nature of such things may require.[17]

In the Epistle Dedicatory to the first volume of the *Philosophical Transactions* Oldenburg reiterated that the journal was his and his alone, but then Oldenburg himself confused the issue considerably. He called the *Philosophical Transactions* "Rude Collections, which are only the Gleanings of my private diversions in broken hours" while at the same time signing the article "Henry Oldenburg. Soc. Reg. Secr."[18] Additionally, he dedicated volumes of the journal to the Royal Society, or to prominent members of that group, and also signed those articles as Secretary of the Royal Society.[19] Given these conflicting signals, the fact that foreign readers believed that the *Philosophical Transactions* represented the Royal Society is not surprising.[20] Oldenburg also published as articles several papers that had been presented before the Society and made sure that his readers were aware of that fact.[21] The *Journal des Sçavans* also contributed to this misconception. In the article announcing the beginning of the publication of the *Philosophical Transactions*, Denis de Sallo suggested that there was a connection between the Royal Society and the journal.[22] The second editor of the *Journal des Sçavans*, Jean Gallois, continued this trend when he re-printed articles from the *Philosophical Transactions* in his own journal, making special note of those that had been presented before the Royal Society.[23] However, it is also interesting to note that even English natural philosophers confused the issue, and not without considerable help from Oldenburg and the Royal Society. In one case, William Durston, a provincial physician, wrote to Viscount Brounker as President of the Royal Society with news about a woman whose breasts had swollen excessively.[24] The letter was read before the Society and Durston was asked to keep the group informed of any developments. He replied in a letter addressed to Oldenburg as Secretary of the Royal Society which Oldenburg subsequently printed as one written to the publisher of the *Philosophical Transactions*.[25] Two further letters were written to Oldenburg as publisher of the journal.[26] The relationship among the *Philosophical Transactions*, the Royal Society, and Oldenburg was a murky one. While both Oldenburg and the Royal Society viewed the *Philosophical Transactions* as Oldenburg's private concern, an undeniable tie existed between the Society and the journal simply because Oldenburg was the secretary of one and the editor of the other. Despite his denials of the connection between the journal and the Society, Oldenburg continued to sign himself "Sec. Soc. Reg." With the sale of copies of the *Philosophical Transactions* on the Continent and the publication of excerpts from the journal in the *Journal des*

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[17] Oldenburg, "Advertisement," *Philosophical Transactions* 1 no. 12 (1666): 213-124.

[18] Oldenburg, "To The Royal Society," *Philosophical Transactions* 1 (1667): 2 pages unnumbered inserted before the first issue.

[19] Volume 1 was dedicated to the Royal Society, Volume 2 was dedicated to Viscount Brounker, the President of the Society, and Volume 4 was dedicated to Seth Ward, Bishop of Exeter, who held a seat on the Council. Hunter, *The Royal Society*, 140-141; Oldenburg, "Royal Society," 2 pages unnumbered; "To the Right Honourable William Lord Viscount Brounker, Chancellor to Her Majesty, and President to the Royal Society, &c.," *Philosophical Transactions* 2 (1668): 1 page unnumbered and inserted before the first issue; "To the Right Reverend Father in God Seth Lord Bishop of Sarum," *Philosophical Transactions* 4 (1670): 2 pages unnumbered and inserted before the first issue.

[20] M.B. Hall, *Promoting Experimental Learning*, 60.

[21] Oldenburg did this for the first time in the third issue where four of the seven articles had been presented at the Royal Society. Thomas Henshaw, "Some Observations and Experiments upon May-Dew," *Philosophical Transactions* 1 no. 3 (1665): 33-36; Robert Moray, "A Relation of Persons killed with Subterraneous Damps" *Philosophical Transactions* 1 no. 3 (1665): 44-45; Moray, "Of the Mineral of Liege, yielding both Brimstone and Vitriol, and the way of extracting them out of it, used at Liege," *Philosophical Transactions* 1 no. 3 (1665): 45-46; Silas Taylor, "Of the Way of killing Ratle-Snakes" *Philosophical Transactions* 1 no. 3 (1665): 43.

[22] Denis de Sallo, "Philosophical Transactions. A Londres, chez Iean Martin & Iames Allistry, Imprimeurs de la Societé Royale, & se trouve à Paris chez Iean Cusson, ruë S. Iacques," *Journal des Sçavans* 1 no. 13 (1665): 156. See also: M.B. Hall, *Promoting Experimental Learning*, 60.

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[23] For example, one of the articles Oldenburg referred to as being presented before the Royal Society was reprinted by Gallois in the *Journal des Sçavans*. Jean Gallois and Thomas Henshaw, "Observations et Experiences Faites sur la Rosée de May, extraites du Journal d'Angleterre & traduites de l'Anglois en François," *Journal des Sçavans* 2 no. 2 (1666): 27-28.

[24] He wrote in because he understood that the Royal Society was interested in all sorts of natural phenomena. William Durston, "An Extract of a Letter Written by the Learned Dr. William Darston, Physitian at Plimouth, to the Right Honorable the Lord Vice-Count Brounker as President of the R. Society; concerning a very sudden and excessive Swelling of a Womans Breasts," *Philosophical Transactions* 4 no. 52 (1669): 1047-1049.

[25] Durston, "This Narrative having been produced and read at the R. Society, and the Author of it thanked for his communication, and desired to impart what he should further observe in this very odd Accident, he was pleased to write, some while after, a second Letter to the Publisher, as follows," *Philosophical Transactions* 4 no. 52 (1669): 1049-1050.

[26] Durston, "An Extract of a Letter Written to the Publisher from Plymouth Novem. 2. 1669. by William Durston Dr. of Physick; concerning the Death of the Bigg-breasted Woman (discoursed of in Numb. 52.) together with what was thereupon observed in her Body," *Philosophical Transactions* 4 no. 53 (1669): 1068-1069; Durston, "An Extract of a Letter Written by Dr. Durston from Plymouth Novemb. 28. 1669. giving an Account, why the late Big-breasted Woman was not open'd after her Death," *Philosophical Transactions* 4 no. 54 (1669): 1077.

Sçavans, it is not at all surprising that a state of confusion existed. However, what is even more interesting is the use which Oldenburg made of this misconception. Since Oldenburg was the Secretary of the Royal Society as well as the editor of the *Philosophical Transactions*, the journal was lent an air of official sanction that it did not actually have. Oldenburg cultivated this while at the same time denying that a link existed between the journal and the Royal Society and used both positions to encourage the communication of scientific information, gather material for an interesting journal, and make that journal into a new and important forum for scientific communication.

An analysis of the contents of the *Philosophical Transactions* reveals many facets of the seventeenth-century scientific community. In particular, this approach elucidates the nature of the national and international scientific community served by the journal and the interactive relationship that the *Philosophical Transactions* had with its readership. The contents of the journal reflected its readers and their interests, while at the same time shaping those interests. By examining the contents of the journal we can see the deliberate development of the *Philosophical Transactions* into a communications nexus under Oldenburg's guidance. He actively encouraged natural philosophers to publish their results in the journal by ensuring that they received credit for their work. Because of Oldenburg, the *Philosophical Transactions* took on the role of mediator to the community, both in general terms and specifically between the Royal Society and the rest of the European scientific community. Finally, Oldenburg used his dual role as Secretary of the Royal Society and editor of the *Philosophical Transactions* to create and settle debates which he then publicized by publishing them in the journal. In this way the *Philosophical Transactions* quickly came to be seen as a place in which to publish in order to achieve recognition of discoveries and a location in which debates on scientific issues could be carried out in a public fashion. It was also a mediator of disputes within the scientific community and as such was involved in the creation of the rules being formed to govern scientific discourse.

Oldenburg intended the journal to communicate the latest developments in England and elsewhere "to such, as apply their Studies and Endeavours" to the "improvement of Philosophical Matters."[27] Our current knowledge about the readership of the journal however remains very limited.[28] Between five hundred and one thousand copies of each issue of the *Philosophical Transactions* were printed in England by English printers under license to the Royal Society, with occasional reprints of selected issues.[29] These issues were sold throughout England and were sent by Oldenburg to interested individuals on the Continent.[30] Copies of the journal were available in Paris in the Rue St. Jaques within three weeks of the publication of the first issue.[31] An unofficial French translation of the *Philosophical Transactions* was made in the late 1660s.[32] The Académie des Sciences also produced a French translation of the journal for its own use.[33] Other unofficial translations and abridgments were later published in French, Latin, Italian and German.[34] Oldenburg also made an attempt to publish an authorized Latin edition of the *Philosophical Transactions* but considerable difficulties associated with the translation process led him to abandon the attempt.[35] In this way, through official and unofficial versions, sold by booksellers or sent by one individual to another, the contents of the journal spread throughout the learned communities in England and Europe. Although the actual readership of the journal will likely remain obscure, the articles in the *Philosophical Transactions* reflect that audience well enough to give a good impression of who was contributing to the journal and who its likely readers were.

The contents of the *Philosophical Transactions* reveal a great deal about the scientific community that it served. Oldenburg selected the articles that appeared in the journal from a variety of sources, including his correspondence and that of other members of the Royal Society, the meetings of the Royal Society, and other publications like the *Journal des Sçavans* and the Italian *Giornale de Letterati.* Interestingly, the authors of the articles are almost always identified, a feature that may have proven an important incentive when Oldenburg began to use the journal to apportion credit for discoveries.[36] The authorship of the articles in the journal falls into several general groups. By far the largest of these were articles written by the domestic and foreign members of the Royal Society, although these men were not always identified as Fellows of the Society. The Royal Society also published articles as a corporation.[37] Non-Royal Society papers of English origin came from a variety of locales, including London, Oxford, Cambridge, and the countryside, and were written by doctors, clergymen, landowners and other interested individuals. Sometimes these articles made their way into the *Philosophical Transactions* after being sent to members of the Royal Society and then forwarded to Henry Oldenburg and sometimes they were sent to Oldenburg directly. It was in this way that David Thomas, an acquaintance of Boyle's, had his observations on a mutant calf published in the *Philosophical Transactions.*[38] Nathanial Fairfax was one of the most prolific contributors who was not a Fellow of the Royal Society. Through his correspondence with Oldenburg, Fairfax, a Suffolk physician, had his observations on a wide variety of subjects communicated to the rest of the scientific community.[39] Articles were also sent in to the journal from English naval officers, ship captains, merchants, and other travellers abroad.[40] Publication in the journal was not restricted to the English or to members of the Royal Society and the work of natural philosophers from across Europe and around the world appeared. The *Philosophical Transactions* also occasionally published material that had been previously printed in the *Journal des Sçavans* or, very rarely, in the *Giornale de Letterati*.[41] During the period of this study the *Philosophical Transactions* printed 13 scientific articles that it extracted from the *Journal des Sçavans* on topics concerning biology, optics and astronomy, medicine, physics and technology.[42] Oldenburg also infrequently used the *Journal des Sçavans*

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[27] Oldenburg, "The Introduction," 1.

[28] Although recent studies have begun to examine the readership of English periodicals, the circulation of the *Philosophical Transactions* in England and Europe has not yet been addressed. See Robin Myers and Michael Harris eds., *Serials and Their Readers 1620-1914*, (Winchester: St Paul's Bibliographies, 1993).

[29] Kronick, "Printing History," 252-253.

[30] *Ibid.*, 252-254.

[31] Andrade, "Birth," 14.

[32] Oldenburg, *Correspondence*, vol. 5, note 2 415-416.

[33] Brown, *Scientific Organizations*, 203-204; Kronick, "Printing History," 257.

[34] Kronick, "Printing History," 258-264.

[35] Andrade, "Birth," 18; *Ibid.*, 254-258.

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[36] The first volume contains the largest number of anonymous articles, 16, with 2, 7, and 8 anonymous articles respectively in the following three volumes.

[37] These articles were most often requests by the Royal Society for the readers of the *Philosophical Transactions* to send in information on a variety of subjects.

[38] David Thomas, "An Account of a very odd Monstrous Calf," *Philosophical Transactions* 1 no. 1 (1665):10; Thomas, "An Observation imparted to the Noble Mr. Boyle, by Mr. David Thomas, touching some particulars further considerable in the Monster mentioned in the first Papers of these Philosophical Transactions," *Philosophical Transactions* 1 no. 2 (1665): 20-21.

[39] Nathaniel Fairfax, "Extract Of a Letter, lately written by Mr. Nathaniel Fairfax to the Publisher, containing Observations about some Insects, and the Inoxiousness, &c.," *Philosophical Transactions* 1 no. 22 (1667): 391-392; Fairfax, "An Account of a great number of Stones, found in one Bladder, by the same," *Philosophical Transactions* 2 no. 26 (1667): 482; Fairfax, "Anatomical Observations on a Humane Body dead of odd Diseases; as they were communicated by Dr. Nathanael Fairfax," *Philosophical Transactions* 2 no. 29 (1667): 546-548; Fairfax, "Divers Instances Of Peculiarities of Nature, both in Men, and Brutes; Communicated by the same," *Philosophical Transactions* 2 no. 29 (1667): 549-551; Fairfax, "An Account of Hail-Stones of an unusual bigness, Communicated by D. Nath. Fairfax, with his Reflections on them," *Philosophical Transactions* 2 no. 26 (1667): 481-482;

Fairfax, "Two other Anatomical Observations, imparted, by the same hand," *Philosophical Transactions* 2 no. 29 (1667): 548-549; Fairfax, "An Extract Of a Letter, written by Dr. Nathan Fairfax to the Publisher, about a Bullet voided by Urine," *Philosophical Transactions* 3 no. 40 (1668): 803-805.

[40] As an example, Major Holmes offered his observations on the use of pendulum-watches during his last naval voyage. Holmes, "A Narrative concerning the success of Pendulum-Watches at Sea for Longitudes," *Philosophical Transactions* 1 no. 1 (1665): 13-15.

[41] The *Giornale de Letterati* began to be published in Italy in 1668. It contained articles reprinted from the *Philosophical Transactions* and the *Journal des Sçavans* as well as articles and book and letter reviews from Italian sources. Only two articles from the *Giornale de Letterati* appeared in the *Philosophical Transactions*: Giornale de Letterati, "An Extract Out of the Italian Giornale de Letterati, about two considerable Experiments of the Transfusion of the Blood," *Philosophical Transactions* 3 no. 42 (1668): 840-841; Giornale de Letterati, "Another Extract Out of the Italian Journal, being a Description of a Microscope of a New fashion, by the means whereof there hath been seen an Animal lesser than any of those seen hitherto," *Philosophical Transactions* 3 no. 42 (1668):842.

[42] Redi, "Some Observations of Vipers. *Philosophical Transactions*" 1 no. 9 (1666): 160-162; Auzout, "Observations About Shining Worms in Oysters," *Philosophical Transactions* 1 no. 12 (1666): 203-206; de la Voye, "A Relation of a kind of Worms that eat out Stones," *Philosophical Transactions* 1 no. 18 (1666): 321-323; Gallois, "A Problem For finding the Year of the Julian Period by a new and very easie Method," *Philosophical Transactions* 1 no. 18 (1666): 324; Gallois, "An Account Of Four Suns, which very lately appear'd in France, and of two Raine-bows, unusually posited, seen in the same Kingdom, somewhat longer agoe," *Philosophical Transactions* 1 no. 19 (1666): 219-222; Divinis, "An Observation of Optick Glasses made of Rock-Chrystal," *Philosophical Transactions* 1 no. 20 (1666): 362; Cassini, "An Extract of a Letter written by Signior Cassini Professor of Astronomy in Bononia, to Monsieur Petit at Paris, and Englished out of the Journal Des Sçavans; concerning severall Spots, lately discover'd there in the Planet Venus," *Philosophical Transactions* 2 no. 32 (1668): 615-617; Huygens and Picart, "An Observation Of Saturne, made at Paris, the 17th of August, 1668. at hor. 11 1/2, at night, by M. Hugens, and M. Picart; as 'tis describ'd in the Journal des Sçavans of Febr. 11. 1669.," *Philosophical Transactions* 4 no. 45 (1669): 900-901; Denis, "An Extract Of a Letter of M. Denis Prof. of Philosophy and Mathematicks to M. *** touching the Transfusion of Blood, of April 2, 1667.," *Philosophical Transactions* 2 no. 25 (1667): 453; Pecquet, "An Extract Of a Letter of M. Pecquet to M. Carcavi, concerning a New Discovery of the Communication of the Ductus Thoracius with the Emulgent Vein: Taken out of the Journal des Sçavans, N. VII. 1667," *Philosophical Transactions* 2 no. 25 (1667): 461-464; Huygens, "A Summary Account Of the Laws of Motion, communicated by Mr. Christian Hugens in a Letter to the R. Society, and since printed in French in the Iournal des Sçavans of March 18. 1669. st. n.," *Philosophical Transactions* 1 no. 46 (1669): 925-928; Gallois, "An Extract Of a Letter, Written from Holland, about Preserving of Ships from being Worm-eaten," *Philosophical*

as a source of reviews of scientific books.[43] As far as can be determined, all of the individuals whose work appeared in the pages of the *Philosophical Transactions* were reasonably well-educated men who would have considered themselves in a general way to be members of the Republic of Letters. They shared a certain level of education and knowledge of natural philosophy and their participation in this discourse shows us that they felt themselves to be members of the scientific community.

The wide variety of authors of articles in the *Philosophical Transactions* should by no means imply that publication in the journal was barrier-free. A certain amount of gate-keeping was carried out by Oldenburg before an article ever appeared in his journal. For example, with the exception of two articles sent in by English merchants living abroad in response to a request for information on the activity of Mount Etna, there were no articles in the journal from individuals who were openly identified as merchants or as members of a less than gentlemanly background.[44] These barriers extended beyond social status or even membership in the broader scientific community, including individuals who Oldenburg felt should be denied access to the journal for other reasons. The exact level of selection is uncertain, but

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Transactions 1 no. 11 (1666): 190-191; Gallois, "A Relation Of the Conferences held at Paris in the Academy Royal for the improvement of the Arts of Painting and Sculpture, as 'tis found in the Iournal des Sçavans," *Philosophical Transactions* 4 no. 47 (1669): 953-956.

[43] The *Journal des Sçavans* was the source for the reviews for three of the one hundred and thirty-four books reviewed in the *Philosophical Transactions* (books II and III in the first review and book II in the second review). Oldenburg, "An Account of some Books lately published. I. PINAX Rerum Naturalium BRITANNICARUM continens VEGETABILIA, ANIMALIA & FOSSILIA in hoc Insula reperta, inchoatus, Auth. Christophoro Merret, Med.D. & utriusque Societatis Regiæ socio. II. PLACITA PHILOSOPHICA Guarini. III. GUSTUS ORGANUM per Laurentium Bellini novissime deprehensum," *Philosophical Transactions* 1 no. 20 (1666): 364-367; Oldenburg, "An Account Of Some Books. I. Le Tome troisieme et dernier des Lettres de M. DESCARTES. II. ASTRONOMIA REFORMATA, Auctore JOHANNE BAPT. RICCIOLI, Soc. Jesu. III. ANATOME MEDULLAE SPINALIS, ET NERVORUM, inde provenientium, GERARDI BLASII, M.D. *Philosophical Transactions* 1(22):392-397, 1667.

[44] Anonymous, "An Answer To some Inquiries concerning the Eruptions of Mount Ætna, An. 1669. Communicated by some Inquisitive English Merchants, now residing in Sicily," *Philosophical Transactions* 4 no. 51 (1669): 1028-1034; Anonymous, "A particular Accompt Of divers Minerals, cast up and burned by the late Fire of Mount Ætna; mentioning the several specimina, expected in Numb. 51. p. 1031. from some ingenious Marchants of England, being upon the place, and since come to the hands of the Publisher, for the R. Society," *Philosophical Transactions* 4 no. 52 (1669): 1041-1042. This anonymity may be a reflection of the fact that merchants formed one of the classes of "unreliable" observers of scientific fact identified by Shapin, *Social History* 93-95.

the case of Thomas Hobbes shows that it was definitely taking place. The antagonism between Hobbes and the Royal Society has been discussed by Steven Shapin and Simon Schaffer.[45] These feelings extended to Oldenburg's treatment of Hobbes' work in the *Philosophical Transactions*. Oldenburg deliberately waited to review Hobbes' book on quadratic equations until after John Wallis' confutation of his work was co-published along with the original text.[46] He also refused to allow Hobbes to carry out a debate with Wallis within the *Philosophical Transactions* despite the fact that several similar debates had been carried out in the pages of the journal.[47] Clearly, Henry Oldenburg made active decisions as to which articles would be published in his journal and social status and personal feelings played some part in his gate-keeping activities. Although these results are preliminary, they support current research that suggests that the scientific community was composing itself along "gentlemanly" lines and conducting itself in the manner of this social class.[48] Further studies will be required to determine exactly what made authors acceptable for publication in the *Philosophical Transactions*.

Oldenburg intended the *Philosophical Transactions* "to spread abroad Encouragements, Inquiries, Directions, and Patterns, that may animate, and draw on Universal Assistances."[49] As interest in a particular subject rose in the general community, so too did the number of related articles in the journal, ensuring that the readers would always remain interested in its contents. However, the *Philosophical Transactions* did more than just react to the interests of the scientific community, it actually helped to shape them. The use of the *Philosophical Transactions* by individuals and the Royal Society to solicit and collect information suggested specific avenues of research to members of the scientific community. This in turn affected the interests of the community and long-term trends in areas of interest revealed by this analysis.

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[45] Shapin and Schaffer, *Leviathan and the Air-Pump*.

[46] Henry Oldenburg, "An Accompt Of some Books. I. Thomæ Hobbes Quadratura Circuli, Cubation Sphæræ, Duplicatio Cubi, confutata, Auth. Johanne Wallis S.T.D. Geometriæ Professore Saviliano, Oxon. 1669. in 4°. II. Historia Geral De Ethiopia a Alta, Em Conimbra A. 1660. in fol. III. An Historical Essay Endeavouring a Probability, That the Language of China is the Primitive Language; by Iohn Webb Esquire. Printed for Nath. Brook in London, 1669. in 8°. IV. An Examen of the way of Teaching the Latin Tongue by Vse alone. Englished out of French, and printed for Mr. Martyn in London, 1669. in 12°," *Philosophical Transactions* 4 no. 48 (1669): 971-976.

[47] Oldenburg, *Correspondence*, vol. 9, 329-330, 374-375; Shapin, "O Henry," 422-423. The role of the journal in moderating such debates will be dealt later in this chapter.

[48] For a discussions of the relationship between civil society and the development and practice of science in England and France respectively see: Shapin, *Social History* and Goldgar, *Impolite Learning*.

[49] Oldenburg, "Royal Society," second page.

The way that the general scientific community affected the *Philosophical Transactions* is best seen in short-term fluctuations in areas of interest, particularly the interest in astronomy seen in the first volume and the interest in medicine in the second volume.[50] These short-term, or ephemeral, interests often reflect external phenomena or discoveries. The years 1665 and 1666 were particularly spectacular astronomical years and many of the large number of astronomical articles in the journal reflect that. A solar eclipse, lunar eclipses, two comets, and a nova were visible in the skies of Europe in these years and observation of these events from multiple locations was published in the journal. In addition, new developments in telescopes enabled astronomers to view the moon and the planets in greater detail than ever before. This allowed the astronomers to postulate and then prove that the planets rotated about their own axes as well as about the sun. By 1667, most of the questions raised by the new discoveries had been solved to the satisfaction of the participants and interest in astronomy dropped off significantly in the following years. A similar increase in the level of interest in medicine occurred with the development of techniques to transfuse first liquors and then blood into animals and then people. Discussion of experimental techniques, results, priority of discovery, and moral and legal aspects of transfusion took up approximately 15% of the total number of articles in Volume 2 and represent half of all the medical articles. Interest in the technique dropped off after the death of a human transfusion recipient in France and a moratorium was declared on further experiments involving human subjects.[51] With the end of the transfusion craze, the number of medical articles in the *Philosophical Transactions* returned to its previous level. As these two cases most dramatically illustrate, Oldenburg's journal responded to the changing interests of the scientific community. When new developments occurred that caught the interest of the community, that increased interest was reflected in the *Philosophical Transactions*, and when those interests changed again so too did the journal.

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[50] See Appendix 2, Analysis of Interests in the *Philosophical Transactions*.

[51] Oldenburg cited concern for the law as the main factor keeping English physicians from being the first to transfuse animal blood into humans. Henry Oldenburg, "An Account Of more Tryals of Transfusion, accompanied with some Considerations theron, chiefly in reference to its Cautious Practice on Man; together with a farther Vindications of this Invention from Usurpers," *Philosophical Transactions* 2 no. 28 (1667): 522. After the death of a recipient the legality of transfusion was argued before the Paris Parlement before sentence was pronounced. Two accounts of this court case appear in the *Philosophical Transactions*. John Denis, "An Extract Of a Printed Letter, addressed to the

The *Philosophical Transactions* also played an active role in directing the interests of the scientific community.[52] Oldenburg used the journal as an interface between the Royal Society, interested individuals, and the general community, publishing requests for information and responses to those requests. These requests represent two somewhat different aspects of scientific research. Individual scholars were able to use the journal to request information to prove or disprove their theories, information which would have been difficult or impossible for them to acquire in a timely fashion. In addition, the Royal Society and some of its Fellows used the *Philosophical Transactions* to gather raw information which they planned to compile into various natural histories.[53] By serving as a public forum in which such information could be requested and supplied, the journal helped to direct the research of interested members of the scientific community.

Publisher, by M. Jean Denis, D. of Physick, and Prof. of the Mathematicks at Paris, touching the differences risen about the Transfusion of Bloud," *Philosophical Transactions* 3 no. 36 (1668): 710-715; Anonymous, "A Letter written by an Intelligent and Worthy English Man from Paris, to a Considerable Member of the R. Society in London, concerning some Transactions there, relating to the Transfusion of Blood," *Philosophical Transactions* 4 no. 54 (1689): 1075-1077.

[52] Questions about factors affecting problem choice among seventeenth-century scientists in general, and members of the Royal Society in particular, have been raised by sociologists. R.K. Merton first raised questions about the effect of external social, economic, and political factors on scientific problem choice in chapters 5-11 and Appendix A of "Science, Technology and Society" and continued exploring similar questions in his later work. "Science, Technology and Society," 439-620. For a discussion of these ideas and their impact on Merton's work see Harriet Zuckerman "The Other Merton Thesis," *Science in Context*, 3 no. 1 (1989): 246-250, 256-260. However, the complicated nature of these interactions has been generally neglected by the scholarly community. Zuckerman, 250-256. For a discussion of the response of the sociological community to these questions see pages 260-262, particularly the footnotes.

[53] For an overview of the Royal Society's natural history and trade history program see: Kathleen Ochs, "The Royal Society of London's History of Trades Programme: An Early Episode in Applied Science," *Notes and Records of the Royal Society of London* 39 (1985): 129-158.

Within the period of this study, the most interesting use of the *Philosophical Transactions* to gather information to prove or disprove a hypothesis was the case of John Wallis and his theories about tidal activity. Wallis originally published his hypothesis on the relation between the gravity of the Earth and Moon and tidal activity in the journal at the request of Henry Oldenburg. Wallis was fully aware that his ideas were controversial and included a discussion of the common objections and his answers to them in his article.[54] In the next issue he published an article in which he made predictions of tidal activity using his theory which he expected would prove or disprove his theory.[55] This was published alongside an article by Robert Moray which proposed a method for individuals to use in observing tides so that they could send in information to help Wallis in his investigation.[56] Moray later published sample tables for recording tidal activity.[57] During the following months, three articles appeared with tables detailing spring and other tides written by those interested in helping Wallis with his research.[58] Wallis too wrote in with observations of the spring tides from several locations and discussed how these observations related to his hypothesis.[59] The use of the *Philosophical Transactions*, at Oldenburg's evident encouragement, as a forum in which to propose a theory, gather information regarding it, and prove or disprove it according to the evidence at hand, demonstrates the role that the journal could have in the scientific community. By serving as an intermediary between theorists and its readers the *Philosophical Transactions* could guide their research interests, encouraging research in particular areas, while providing valuable information to the originator of the theory. This use of the journal also allowed members of the broader scientific community to contribute to the work of a well-known individual. None of the individuals who wrote in responding to this request were members of the Royal Society, although the initiators of the request, John Wallis and Robert Moray, were Fellows. Replying to this request allowed non-fellows to contribute to a scientific project and to join in the discourse in a meaningful way.

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[54] John Wallis, "An Essay Of Dr. John Wallis, exhibiting his Hypothesis about the Flux and Reflux of the Sea. taken from the Consideration of the Common Centre of Gravity of the Earth and Moon; together with an Appendix of the same, containing an Answer to some Objections, made by several Persons against the Hypothesis," *Philosophical Transactions* 1 no. 16 (1666): 263-289.

[55] Wallis, "Some Inquiries and Directions concerning Tides, proposed by Dr. Wallis, for the proving or disproving of his lately publish't Discourse concerning them," *Philosophical Transactions* 1 no. 17 (1666): 297-298.

[56] Robert Moray, "Considerations and Enquiries concerning Tides, by Sir Robert Moray; likewise for a further search into Dr. Wallis's newly publish't Hypothesis," *Philosophical Transactions* 1 no. 17 (1666): 298-301. Oldenburg also solicited information for Wallis from his correspondents. A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 3, xxiv.

[57] Moray, "Patterns of the Tables proposed to be made for Observing of Tides, promised in the next forgoing Transactions' by Sir Robert Moray," *Philosophical Transactions* 1 no. 18 (1666): 311-314.

[58] Samuel Colepresse, "An Account Of some Observations, made by Mr. Samuel Colepresse at and nigh Plimouth, A. 1667. by way of Answer to some of the Quæries concerning Tydes, propos'd Numb. 17. and 18.," *Philosophical Transactions* 3 no. 33 (1668): 632-634; Henry Phillips, "An Letter written to Dr. John Wallis by Mr. Henry Phillips, containing his Observations about the True Time of the Tides," *Philosophical Transactions* 3 no. 34 (1668): 656-659; Samuel Sturmy, "An Account of some Observations, made this present year by Capt. Samuel Sturmy in Hong-road within four miles of Bristol, in Answer to some of the Queries concerning the Tydes, in No. 17 & No. 18.," *Philosophical Transactions* 3 no. 41 (1668): 813-817.

[59] Wallis, "A Letter. Written by Dr. John Wallis to the Publisher, concerning the variety of the Annual High-Tydes, as to several places; with respect to his own Hypothesis, deliver'd No. 16., touching the Flux and Reflux of the Sea," *Philosophical Transactions* 3 no. 34 (1668): 652-653.

The *Philosophical Transactions* also played an important role in attempts to write various natural histories and, in this way, helped to affect the long-term interests of the scientific community. Collecting sufficient information to write a Baconian-style natural history was a complicated endeavour, best undertaken by corporations which had greater resources than individuals. Both the Royal Society and the Académie des Sciences embarked on various natural history projects.[60] However, unlike its Parisian counterpart, the Royal Society actively solicited information on a variety of subjects using the *Philosophical Transactions*. These inquiries touched on agriculture,[61] all manner of naval and marine subjects,[62] and a wide variety of exotic locations.[63] As editor, Oldenburg took an active role in encouraging his readers to carry out research on these topics. In at least one case, he solicited information in his own right from one of his correspondents and published the results.[64] Oldenburg also encouraged people to write in and praised those who did so in an appropriate manner. For example, he suggested to his readers that they use Henry Stubbe's articles as an example for their own contributions to natural histories.[65] These requests also affected the activities of English travellers and the published accounts of their work.[66] Between active encouragement and positive reinforcement Oldenburg ensured that the attention of the community would be regularly turned towards providing information for natural histories and they responded with letters that became the basis for several articles.[67] These queries and responses formed the overwhelming majority of the natural history articles appearing in the *Philosophical Transactions.*

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[60] For the Royal Society's natural history program see Ochs, "History of Trades," 129-158. For an analysis of the Académie des Sciences' natural history program see especially chapters six through twelve in Stroup, *Company*.

[61] Committee of the Royal Society, "Enquiries concerning Agriculture," *Philosophical Transactions* 1 no. 5 (1665): 92-94. There was also an anonymous request for information towards a natural history of plants which resulted in a number of replies. Anonymous, "Queries Concerning Vegetation, especially the Motion of the Juyces of Vegetables, communicated by some Curious persons," *Philosophical Transactions* 3 no. 40 (1668): 792-795.

[62] This topic was a particularly popular one. Royal Society, "Directions for Sea-men, bound for far voyages," *Philosophical Transactions* 1 no. 8 (1666): 140-143; Royal Society, "An Appendix to the Directions for Seamen, bound for far Voyages," *Philosophical Transactions* 1 no. 9 (1666): 147-149; Royal Society, "Directions for Observations and Experiments to be made by Masters of Ships, Pilots, and other fit Persons in the Sea-Voyages," *Philosophical Transactions* 2 no. 24 (1667): 433-448.

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[63] In most cases the Royal Society was clearly identified as the source of these inquiries. Royal Society, "Inquiries for Hungary and Transylvania," *Philosophical Transactions* 2 no. 25 (1667): 467-469; Royal Society, "Inquiries for Greenland," *Philosophical Transactions* 2 no. 25 (1667): 554-555; Royal Society, "Inquiries and Directions For the Ant-Iles, or Caribe-Islands," *Philosophical Transactions* 3 no. 33 (1668): 634-639. There were two articles with clearly identified authors, both Fellows, that were published among several of the Royal Society's articles in Number 25. However, I believe that these articles were also representative of the Society's interests. Thomas Henshaw, "Inquiries For Ægypt, by Thomas Henshaw Esq.," *Philosophical Transactions* 2 no. 25 (1667): 470-472; Abraham Hill, "Inquiries for Guiny," *Philosophical Transactions* 2 no. 25 (1667): 472.

[64] Anonymous, "Some Observations Concerning Iapan, made by an Ingenious person, that hath many years resided in that Country; as they were communicated in French by M. I; whence they are thus English'd by the Publisher; who some months agoe occasion'd this Accompt by some Quaeries, sent to that Traveller," *Philosophical Transactions* 4 no. 49 (1669): 983-986.

[65] This was before Stubbe's attacks on the Royal Society in the 1670s. Henry Stubbe, "Observations Made by a Curious and Learned Person, sailing from England to the Caribe-Islands," *Philosophical Transactions* 2 no. 27 (1667): 494-502; Stubbe, "An Enlargement Of the Observations, formerly publisht Numb. 27, made and generously imparted by that Learn'd and Inquisitive Physician, Dr. Stubbes," *Philosophical Transactions* 3 no. 34 (1668): 699-709; Stubbe, "The Remainder Of the Observations made in the formerly mention'd Voyage to Jamaica, publisht Numb. 36.," *Philosophical Transactions* 3 no. 37 (1668): 717-722; Hunter, *The Royal Society*, 22, 38-39; Syfret, "Early Critics," 20-38.

[66] Under the influence of these requests English travelers set out on their voyages intending to help contribute to the Royal Society's quest for useful knowledge. When their accounts were published upon their return to England most remarked upon the natural phenomena that they had seen. Some even dedicated their books to the Royal Society and others returned with collections of material which were sometimes donated to the Society. R.W. Frantz, *The English Traveller and the Movement of Ideas 1660-1732* (University of Nebraska Press, 1934; reprint, New York: Octagon Books, 1968), 1-71.

[67] Interestingly the majority of these articles were written by individuals who were not Fellows of the Royal Society. In some ways this finding is not surprising, since the Fellows would be less likely to be traveling about the globe, but they generally seem to be much more interested in posing the questions and correlating the results than in carrying out this sort of research. This is in line with the work of

Henry Oldenburg's aspirations for the *Philosophical Transactions* went far beyond merely reporting on the doings and discoveries of the members of the scientific community. He deliberately set out to make the journal a published public forum in which scientists could carry out debates and claim priority for their discoveries.[68] Oldenburg used his correspondence and his position as Secretary of the Royal Society to help lend authority to the journal and he used his position as editor to stir up and influence debates and to settle them.[69] Arguments among members of the scientific community were not new; they had been carried out in correspondence and in printed monographs or letters long before the creation of the journal.[70] However, the use of the *Philosophical Transactions* as a location for the publication of such debates made these discussions more accessible to the wider community, as well as making the journal much more interesting for its readers. Each of the case studies discussed in the following section reveals different facets of the journal's developing relationship with the scientific community.

Oldenburg deliberately introduced the role of forum for and mediator of scientific debates to the *Philosophical Transactions*. The best example of a debate deliberately provoked and then published by Oldenburg within the period of this study is the argument between Adrien Auzout and Johannes Hevelius on the motion

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Salomon's House, a society proposed by Bacon in his *Novum Organum*, on which the Royal Society was ostensibly modeled. Hunter and Wood, "Solomon's House," 49-108.

[68] Merton and Zuckerman have very generally discussed the role of Henry Oldenburg, the Royal Society and the *Philosophical Transactions* in institutionalizing the scientific referee or review system. Although I agree with their general assertions, I believe that the relationship is somewhat more complicated than their discussion intimates. Merton and Zuckerman, "Institutionalized Patterns of Evaluation in Science," in Merton, *The Sociology of Science: Theoretical and Empirical Investigations*, ed. and introduction by Norman W. Storer (Chicago: University of Chicago Press, 1973), 462-470.

[69] A.R. Hall and M.B. Hall refer to Oldenburg as being "an eminently successful practitioner of the theory that it was good to crack men's heads together, for thence came the advancement of science." Oldenburg, *Correspondence*, vol. 2, xxiii.

[70] The role that Oldenburg's correspondence played in the mediation of debates and in consensus-making in the international scientific community has been briefly discussed by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 2, xxi-xxiii; vol. 3, xxiv-xxvi; and Shapin, "O Henry," 417-422.

of the comet of 1664/5.[71] Auzout published his observations of the comet first in his printed letter *L'Ephéméride du Comète*, dated January 2, 1665, in which he suggested that the motion of the comet was circular, and he then sent a copy of it to the Royal Society in care of Henry Oldenburg.[72] An English translation of this letter later appeared in the *Philosophical Transactions*.[73] Hevelius, who argued that the comet followed a conical or elliptical path, published his own book on the comet, *Prodromus cometicus*, in May of 1665 and also sent a copy of the book to Oldenburg.[74] It quickly became clear to the community that there were discrepancies between the work of Auzout and Hevelius.[75] Auzout wrote to Oldenburg requesting that he have the Royal Society "pass judgment" on the issue.[76] At first Oldenburg mediated this dispute through his correspondence.[77] He wrote to Hevelius in August 1665 informing him of Auzout's critique of his work and inquiring about his response.[78] Desiring to see his work vindicated, Hevelius responded agreeing to release additional information, which he would otherwise have delayed publishing, to help the Royal Society adjudicate the debate.[79] Oldenburg then forwarded the information to several members of the English astronomical community for their judgment.[80] While waiting for the members of the Royal Society to reach their decision, Oldenburg published news of the debate in the *Philosophical Transactions* and announced that an impartial committee would be deciding the issue.[81] This moved what had been a mostly private debate into the public arena. After due consideration and consultation with French, Italian, and Dutch astronomers, the English astronomers made their decision, siding with Auzout over Hevelius. Oldenburg first wrote to Hevelius informing him very tactfully of this decision.[82] Shortly thereafter he published news of the decision in the *Philosophical Transactions*.[83] Hevelius continued to defend his theories, both in correspondence and print into 1667, but Auzout had lost interest.[84] The course of this debate dramatically reveals how Oldenburg used his correspondence and his position as Secretary of the Royal Society to stir up and settle debates among members of the scientific community. The presence of a debate between two well-known astronomers was good for more than just the circulation of the *Philosophical Transactions*. Oldenburg's deliberate decision to publicize the debate in the pages of the journal had important repercussions for the relationship between the journal and the community. It got the readers of the *Philosophical Transactions* used to the idea that the journal was an appropriate forum for these sorts of debates. It also introduced and popularized an "acceptable" method of problem-solving for such debates, mediation by a supposedly disinterested third party whose decision should be accepted in good faith by both parties. Since that third party was associated with the

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[71] During the majority of this debate Oldenburg was mediating not only between two of his correspondents but also between a Fellow of the Royal Society and a non-Fellow. Hevelius had been a member of the Royal Society from March 30, 1664. Auzout became a Fellow of the Royal Society May 23, 1666. Hunter, *Royal Society*, 166, 174. The particulars of this debate as reported in Sprat's *History* and the *Philosophical Transactions* were very briefly discussed in: N.S. Hetherington, "The Hevelius-Auzout Controversy," *Notes and Records of the Royal Society of London* 27 (1972): 103-106. Shapin has examined the aspects of this controversy which relate to decisions on matters of fact in the scientific community. Shapin, *Social History*, 260-290.

[72] Adrien Auzout, *L'Ephéméride du Comète*, (Paris, 1665). Bibliographical and other information from Oldenburg, *Correspondence*, vol. 2, 341-2, 660.

[73] Adrien Auzout, "The motion of the late comet prædicted," *Philosophical Transactions* 1 no. 1 (1665): 3-8; Auzout, "The Motion of the Second Comet predicted, by the same Gentleman, who predicted that of the former," *Philosophical Transactions* 1 no. 3 (1665): 36-40.

[74] Johannes Hevelius, *Prodromus Cometicus*, (Danzig, 1665). Bibliographical and other information from Oldenburg, *Correspondence*, vol. 2, 392-399, 666.

[75] See the section on news from France in the letter that Oldenburg sent to Boyle in June of 1665. *Ibid.*, 405-408.

[76] *Ibid.*, 426.

[77] There are 25 letters dealing with the debate published in Oldenburg's correspondence. Oldenburg, *Correspondence*, vol. 2, 405-408, 418, 425-426, 493-495, 528-529, 547, 551-553, 556-557, 560, 566, 568-569, 574, 582-583, 609-610, 621-625; vol. 3, 3-8, 19, 24, 29-31, 72, 75, 82-84, 113-115, 150-152, 167-172, 215, 219, 294, 298, 304, 313, 323, 327, 330, 342, 352-4, 390-391, 484-486, 515, 518-519.

[78] Oldenburg, *Correspondence*, vol. 2, 452.

[79] *Ibid.*, 495.

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[80] These astronomers included Lord Brouncker, Sir Robert Moray, and Robert Boyle. *Ibid.*, 547, 549, 556-7, 560, 568, 569.

[81] Oldenburg, "An Account of Hevelius, his Prodromus Cometicus, together with some Animadversions made upon it by a French Philosopher," *Philosophical Transactions* 1 no. 6 (1665): 108.

[82] Oldenburg, *Correspondence*, vol. 3, 29-31.

[83] English Astronomers, "Of the Judgment of some of the English Astronomers touching the difference between learned men, about and Observation made of the First of the two late Comets," *Philosophical Transactions* 1 no. 9 (1666): 150-151.

[84] Oldenburg, "An Account Of Several Books lately published. I. Johannis Hevelii Descriptio Cometae, Anno Æræ Christianæ MDCLXV. exorti; unà cum Mantissa Prodromi Cometici, Observationes omnes prioris Cometæ MDCLIV, ex iisque genuinum motum accuratè deductum, eum Notis & Animadversionibus, exhibens. II. Isaacus Vossius de Nili et Aliorum Fluminum Origine. III. Le Discernement du Corps & de l'Ame, par M. de Cordemoy," *Philosophical Transactions* 1 no. 17

Royal Society, it encouraged the already prevalent belief in Europe that the Society was a legitimator of experimental knowledge and added to the prestige of the Society and the journal.[85] The publication of the debate and its resolution in the pages of the *Philosophical Transactions* also provided the participants with publicity and the winner with public recognition of the correctness of his views.

Under Oldenburg's influence the *Philosophical Transactions* also came to be seen as a public forum in which members of the scientific community could defend themselves from real or perceived attacks on their work. In one case, a controversy began when François Dulaurens sent a copy of his new book, *Specimina Mathematica duobus Libris comprehensa*, to Oldenburg to be reviewed by the Royal Society.[86] Oldenburg sent the book to John Wallis for reviewing. After receiving and reading the book Wallis sent his review to Oldenburg in an English letter with a Latin translation to be printed in the next issue of the *Philosophical Transactions*.[87] Wallis complained about several things in his review. He accused Dulaurens of copying material from William Oughtred and himself without due credit:

> Videtur autem plus fronte polliceri, quam opere absolvit. *Priois* libri pars magna, ex *Oughtredi* meisque scriptis (utut neutrius ibi meminerit) videtur desumpta, idque tam manifeste, ut non modo peculiare loquendi formulas, sed & ipsa symbola Notasque passim retineat.[88]

(1666): 301-310; Oldenburg, *Correspondence*, vol. 3, 72, 75, 113, 115, 150-152, 167-72, 215, 219, 294, 298, 313, 323, 327, 330, 342, 352-354, 390-391.

[85] For the way that the Royal Society was viewed in various countries of Europe as a patron, publisher, and judge, if a sometimes unwilling one, of the experimental philosophy, see M.B. Hall, *Promoting Experimental Learning*, 140-154.

[86] François Dulaurens, *Specimina Mathematica duobus Libris comprehensa*, (Paris, 1667) bibliographic information and request for review in Oldenburg, *Correspondence*, vol. 3, 335-337. The notice and short review of the book appear in Oldenburg, "An Account of some Books. I. Petri Labecii Lib. Primus Prodromi Historiæ Literariæ, &c. II. Thomæ Cornelii Consentini Progymnasmata Physica. III. Les Essays Physiques du Sieur de Launay, Liv. premier. IV. Francisci du Laurens Specimina Mathematica, duobus Libris comprehensa," *Philosophical Transactions* 2 no. 30 (1667): 575-580.

[87] Oldenburg, *Correspondence*, vol. 4, 285-292; John Wallis, "Another Letter Written by the same Hand, concerning some Mistakes, to be found in a Book lately publish'd under the Title of Specimina Mathematics Francisci Du Laurens, especially touching a certaine Probleme, affirm'd to have been proposed by Dr. Wallis, to the Mathematicians of all Europe, to solve it," *Philosophical Transactions* 3 no. 34 (1668): 654-655.

[88] Wallis, "Another Letter," 654. The English version of the letter reads: "A great part of his first booke, seems to be taken out of Mr *Oughtred* & my self, (though he doth not there so much as name

He also complained about several specific problems, and was particularly incensed by Dulaurens' assertion that Wallis had issued a challenge to all the mathematicians of Europe.[89] The ensuing debate took place almost entirely in print. Each of the combatants published their arguments, Dulaurens as printed letters and Wallis in the *Philosophical Transactions*. Oldenburg and Henri Justel acted as middlemen, exchanging comments and publications to be forwarded to the principals in the debate.[90] Indeed it was Justel's belief that the publication of Wallis' reply exacerbated the debate:

> Literary men are too touchy, in my view, and take offense too easily. This is not the way to come to an understanding of the truth; but there is no room for hope that they will ever mend their ways. If Mr. Wallis's letter had not been printed he [Dulaurens] would not have cared about it.[91]

Dulaurens responded to Wallis' accusations with a letter to Oldenburg followed by a printed letter, *Responsio Francisci Dulaurens ad epistolam D. Wallisii ad clarissimum virum Oldenburgium scriptam*.[92] Wallis in his turn replied with letters defending his point of view which he requested that Oldenburg insert into the *Philosophical Transactions*.[93] In those articles Wallis continued to complain mainly about his work being used without credit and that his name was misused by being tied to the question put to the European mathematicians.[94] This debate was essentially

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either of us,) & that so evidently, that he doth many times not only retain the peculiar phrases & forms of speaking, but ye very same Notes & Symbols." Oldenburg, *Correspondence*, vol. 4, 286.

[89] Wallis, "Another Letter," 654-655; Oldenburg, *Correspondence*, vol. 4, 285-291.

[90] Justel made sure that Dulaurens received a copy of the *Philosophical Transactions* and sent along Dulaurens' replies to Oldenburg. Oldenburg similarly made sure that those replies were passed along to Wallis and published Wallis' responses in the *Philosophical Transactions*. Oldenburg, *Correspondence*, vol. 4, 402-406, 427-430, 461-463, 488-505, 508-509, 542-547, 553-554, 560-561.

[91] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 4, 462.

[92] Dulaurens, *Respondio Francisci Dulaurens as epistolam D. Wallisii ad clarissimum virum Oldenburgium scriptam*, (Paris, 1668?). Letter and bibliographic information from Oldenburg, *Correspondence*, vol. 4, 398-401.

[93] Oldenburg, *Correspondence*, vol. 4, 488-497, 553-554, 560-561.

[94] Wallis, "Some Animadversions, written in a Letter by Dr. John Wallis, on a printed Paper, entitl'd, Responsio Francisci Du Laurens as Epistolam D. Wallisii ad Cl. V. Odenburgiam scriptam,"

futile, and indeed has been referred to as "typical of seventeenth-century mathematical controversy, but more sterile even than usual."[95] However, the purposefully public way in which the debate was conducted is very revealing. Unlike the debate between Auzout and Hevelius which had been first been carried out in correspondence and then later transferred into print, this argument took place in the public forum of print as an exchange of views between the *Philosophical Transactions* and printed pamphlets. Indeed, the participants *expected* the debate to be published, not only in England, but in France. Additionally, at least one of the participants took the debate more seriously *because* it was in print. This reflects a significant evolution in the contributors' use of the *Philosophical Transactions* as a continuous forum for the public exchange of opinions.

It was not necessary to be a member of the Royal Society or an important European scientist in order to debate issues in the *Philosophical Transactions*. In 1669 a group of regional philosophers entered into a debate concerning the use of hot and mineral springs in medicine. The origin of the debate was Oldenburg's review of William Simpson's *Hydrologia Chymica*.[96] Dr. Robert Wittie disagreed with several of Simpson's statements and wrote a book highlighting his own ideas and experimental findings on mineral springs which Oldenburg reviewed in turn.[97] A debate about the usefulness and chemical nature of springs ensued among Wittie,

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Philosophical Transactions 3 no. 38 (1668): 744-750; Wallis, "A second Letter of Dr. John Wallis on the same printed Paper of Franciscus Du Laurens, mention'd in the next forgoing Transactions," *Philosophical Transactions* 3 no. 39 (1668): 775-779; Wallis, "A Continuation of Dr. Wallis his second Letter, Publish't in Numb. 39, to the printed Paper of Mr. Du Laurens," *Philosophical Transactions* 3 no. 41 (1668): 825-832.

[95] A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 4, xx.

[96] Oldenburg, "An Account of two Books. I. A Continuation of New Experiments Physico-Mechanical, touching the Spring and Weight of the Air, and their Effects; the I. Part, &c. by the Honourable Robert Boyle, Fellow of the Royal Society, Oxford: 1668 in 4°. II. Hydrologia Chymica, or The Chymical Anatomy of the Scarborough and other Spaws in York-Shire, &c. by W. Sympson. Londin, 1668. in 8°," *Philosophical Transactions* 3 no. 42 (1668): 845-852.

[97] Oldenburg, "An Accompt of some Books. I. Marc. Malpigii. Phil. & Med. Bononiensis Dissertatio Epistolica De Bombyce, Regiæ Societati dicata. Printed at London for Iohn Martin and Iames Allestry Printers the R. Society, in 4°. II. Description Anatomique d'un Cameleon, d'un Castor, d'un Dromedaire, d'un Ours, et d'une Gazelle. A Paris 1669. in 4°. III. Labyrinthus Algebræ, Auth. Joh. Jac. Ferguson. Printed at the Hague in 4°. 1667. IV. An Answer to Hydrologia Chymica, of William Sympson, by Robert Wittie, M.D. Printed for John Martyn at the Bell without Temple-Barr, in 8° 1669," *Philosophical Transactions* 4 no. 49 (1669): 987-1000.

Daniel Foot, Nathaniel Highmore, and John Beale.[98] The importance of this debate to the present study lies not in its scientific merits, but rather in the fact that only one of the less significant participants, John Beale, was a Fellow of the Royal Society.[99] By 1669, the *Philosophical Transactions* had come to be seen as a place where any member of the scientific community could begin and participate in scientific debates. Provincial scientists could see themselves in the pages of the *Philosophical Transactions* as active participants of the scientific community, working alongside their more illustrious colleagues. For provincial natural philosophers, many of whom worked in isolation, publication in the *Philosophical Transactions* offered public recognition and validation of their work.

Priority disputes form a special and important category of scientific debates in the *Philosophical Transactions*. Being granted priority of discovery could prove very beneficial for a scientist, socially if not monetarily.[100] Disputes could arise over simultaneous discoveries, plagiarism, claiming the origin of a particular idea, and other issues.[101] During the seventeenth century the scientific community developed several methods for dealing with questions of priority. Before the advent of the scientific journal the most obvious method of establishing priority for a discovery was the publication of that discovery, either in a book or in a printed letter. One time-honoured method of establishing priority while still retaining secrecy involved writing a sealed or coded letter and placing it in the hands of a third party for safe-keeping. The Royal Society served as such a repository and took an active role in establishing priority of discovery and in attributing ownership of an idea or material to a specific individual.[102] Although the Society continued to register ciphered letters, it is clear by early in 1669 that the Fellows of the Society had come to prefer publication as a method of establishing priority.[103] Oldenburg himself worked to develop the *Philosophical Transactions* as a place in which scientists could publish to ensure their priority, even if they did not have enough material to warrant writing a book. When Auzout gained recognition from the community for the extracts and review of his *L'Ephéméride du Comète*, another astronomer wrote from Rome saying that he had reached the same conclusions but had not found them "fit to declare" and so had missed his chance to claim possible priority for the discovery.[104] In another instance, Oldenburg considered a very short note by Robert Hooke announcing the discovery of a "Spot in one of the Belts of Jupiter" sufficient to give him pride of discovery over Giovanni Cassini and Eustachio Divini.[105] Such occurrences must have encouraged philosophers to communicate their results early to ensure that they received full credit for their discoveries. Oldenburg also used the *Philosophical Transactions*, reinforced by his position as Secretary of the Royal Society, to mediate during priority disputes and apportion praise for the discovery.

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[98] Oldenburg, "An account of two Books. I. Discours de M. Stenton sur l'Anatomie de Cerveau. A Paris 1669. in 12°. II. Instead of the other Book, of which we purposed to give here Accompt, we find our selves obliged somewhat to enlarge that which was, for want of more leisure, too cursorily given in Numb. 49. of Dr. Witties *Answer to Hydrologia Chymica*, concerning the *Scarbrow Spaw*," *Philosophical Transactions* 4 no. 51 (1669): 1034-1040. Wittie's reply to the other articles appears outside of the scope of this study in Volume 5 of the *Philosophical Transactions*. His findings were presented in front of the Royal Society April 28, 1670. Oldenburg, *Correspondence*, vol. 6, 605-610; vol. 7, 3-4, 52-53. Foot wrote a letter to Oldenburg in which was later published in the *Philosophical Transactions*. Oldenburg, *Correspondence*, vol. 6, 275-279; Daniel Foot, "Some Reflexions Made on the enlarged Accompt of Dr Witties Answer to Hydrologia Chymica in Numb. 51. of these Tracts; chiefly concerning the Cause of the sudden loss of the virtues of Mineral waters," *Philosophical Transactions* 4 no. 52 (1669): 1050-1055. Nathaniel Highmore, "Some Considerations Relating to D. Witties Defence of Scarborogh Spaw (abbreviated in Numb. 51.) together with a brief Accompt of a less considerable Salt-spring in Somerseth; and of a Medical Spring in Dorsetshire; by the Lerned Dr. Highmore in a Letter to Dr. J. Beale at Yeavil in Somerseth," *Philosophical Transactions* 4 no. 56 (1670): 1128-1131; John Beale, "The Causes of Mineral Springs further inquired: And the strange and secret Changes of Liquors examined; by Dr. J. Beale, to the Publisher," *Philosophical Transactions* 4 no. 56 (1670): 1131-1134.

[99] Beale was a provincial member of the Royal Society and not part of the London core of the group. Hunter, *The Royal Society*, 160-1.

[100] The sociological aspects of scientific priority disputes from the seventeenth through the early-twentieth century were first brought to light in R.K. Merton's 1957 presidential address to the American Sociological Society. Merton "Priorities in Scientific Discovery," in Merton *Sociology of Science*, 286-324. However, interest in priority was slow to gain a foothold in the sociological community. Merton, "Three Fragments from a Sociologist's Notebooks: Establishing the Phenomenon, Specified Ignorance, and Strategic Research Materials," *Annual Review of Sociology*, 13 (1987): 21-23.

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[101] Merton suggested that examining these different sorts of priority dispute and disputes in general could be very revealing of the actual nature of the scientific community, the norms of that community, and the motivating factors driving the scientific enterprise. Merton, "Multiple Discoveries as Strategic Research Site," in Merton, *Sociology of Science*, 371-382; Merton, "Priorities," 292-305, 312-316.

[102] Rob Iliffe, "'In the Warehouse": Privacy, Property and Priority in the Early Royal Society," *History of Science* 30 (1992): 29-39.

[103] A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, xxi-xxii.

[104] Anonymous, "Extract of a Letter, lately written from Rome, touching the late Comet, and a New one," *Philosophical Transactions* 1 no. 2 (1665): 17-18.

[105] Hooke, "A Spot in one of the Belts of Jupiter," *Philosophical Transactions* 1 no. 1 (1665): 3; Hooke, Cassini, and Oldenburg, "Of a permanent Spot in Jupiter: by which is manifested the conversion of Jupiter about his own Axis," *Philosophical Transactions* 1 no. 8 (1666): 143-145; Hooke, Cassini, Oldenburg, and Divini, "Some particulars, communicated from forraign parts, concerning the Permanent Spott in Jupiter; and a Contest between two Artists about Optick Glasses, &c," *Philosophical Transactions* 1 no. 12 (1666): 209-210.

The most spectacular use of the *Philosophical Transactions* for mediating in such a case was the debate over the country of origin of the technique of blood transfusion.[106] The first successful experiment in transfusing the blood out of one animal into another was reported in the *Philosophical Transactions* November 19, 1666.[107] After this first article interest in the technique rapidly increased in England and in France. Questions of precedence quickly complicated the debate. Oldenburg defended the English claim to have been first to perfect the technique.[108] The French case was made by Jean Denis in printed letters which were abstracted in the *Philosophical Transactions*[109] and the *Journal des Sçavans.*[110] Oldenburg replied to these charges, belittling the French claims but seeking to come to a reconciliation in the matter and "to give every one his due, as near as can be discerned by the *Publisher*."[111] Although interest in the technique dropped off soon after the death of the French transfusion recipient, arguments over the primacy of discovery continued. Timothy Clarke joined in the debate on the side of the English,[112] though his contribution has been deemed "a device for ensuring publication in the *Philosophical Transactions*."[113] Denis continued to support French claims.[114] The Italians too ventured a claim to the priority of discovery of the technique, but Oldenburg did not take their claim seriously.[115] The final note on the transfusion debate was sent to Oldenburg from an Englishman in Paris. He was present at the debates on transfusion held before the Parlement of Paris where he says the Royal Society was given precedence and priority of discovery.[116]

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[106] The transfusion debate has been examined on four previous occasions. Ornstein and Weld examined it from the point of view of establishing priority of discovery. Ornstein, *Scientific Societies*, 118-119; Weld, *History*, 190-200. A.R. Hall and M.B. Hall examined the dispute first in editing Oldenburg's correspondence and then in order to correct a historical misunderstanding of the issue. A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 4, xx-xxii; A.R. Hall and M.B. Hall, "The First Human Blood Transfusion: Priority Disputes," in *Science and Society*, ed. A.R. Hall, (Aldershot: Variorum, 1994. Shapin too briefly explored the debate from the point of view of Oldenburg's correspondence. Shapin, "O Henry," 420.

[107] Oldenburg, "The Success of the Experiment of Transfusing the Blood of one animal into another," *Philosophical Transactions* 1 no. 19 (1666): 352.

[108] Oldenburg, "An Advertisement concerning the Invention of the Transfusion of the Bloud," *Philosophical Transactions* 2 no. 27 (1667): 489-490.

[109] In fact, while Oldenburg was imprisoned in the Tower of London, one of Denis' letters was published by the same printer that published in the *Philosophical Transactions* with the issue number 27 in the top right-hand corner and appropriate pagination for issue 27 of the *Philosophical Transactions*. The letter was not published under the title "Philosophical Transactions" but copies of it have been found bound in with volumes of the *Philosophical Transactions*, as in Volume 2 of the *Philosophical Transactions* in Memorial Library, University of Wisconsin Madison. The confusion surrounding this "false" issue 27 was apparently sufficient that Oldenburg printed a retraction to it in issue 27 of the *Philosophical Transactions*. Denis, *A LETTER Concerning a new way of curing sundry diseases by Transfusion of Blood, Written to Monsieur de MONTMOR, Counsellor to the French King, and Master of Requests*, (London: Martin and Allestry, 1667), 489-504; Denis, "A Relation Of some Trials of the same Operation, lately made in France," *Philosophical Transaction*, 2 no. 30 (1667): 559-564; Denis, "An Extract Of a Letter, written by J. Denis, Doctor of Physick, and Professor of Philosophy and the Mathematicks at Paris, touching a late Cure of an Inveterate Phrenzy by the Transfusion of Bloud," *Philosophical Transactions* 2 no. 32 (1668): 617-624; Denis, "An Extract Of a Letter of M. Denis Prof. of Philosophy and Mathematicks to M. *** touching the Transfusion of Blood, of April 2, 1667," *Philosophical Transactions* 2 no. 25 (1667): 453.

[110] Denis, "Extrait d'Une Lettre de M. Denis, Professeur de Philosophie & de Mathematique, à M. *** touchant la transfusion du sang. De Paris ce 9. Mars 1667," *Journal des Sçavans* 3 no. 6 (1667): 69-72; Denis, "Extrait d'Une Lettre de M. Denis Professeur de Philosophie & de Mathematique, à M. ***

The story of the transfusion debate in the *Philosophical Transactions* displays all of the features of the new practice of scientific journal publishing. Publication in the *Philosophical Transactions* not only helped to spread the word of a new discovery and enhance the fame of the discoverer, but also to establish precedence. Establishing priority gave the discoverer additional status and recognition before his peers. The ensuing developments in transfusion technique and the debate over priority were pursued mainly in print in England and in France. Henry Oldenburg

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touchant la Transfusion du sang. Du 2. Avril 1667," *Journal des Sçavans* 3 no. 8 (1667): 96; Denis, "Lettre de M. Denis Professeur de Philosophie et de Mathematique, à M. de Montmor premier Maistre des Requestes; touchant deux Experimentes de la Transfusion faites sur des hommes. In 4°. A Paris, chez I. Cusson," *Journal des Sçavans* 3 no. 11 (1667): 134-136.

[111] Oldenburg, "An Account," 524-525.

[112] Timothy Clarke, "A Letter, written to the Publisher by the Learned and Experienced Dr Timothy Clarck one of His Majesties Physitians in Ordinary, concerning some Anatomical Inventions and Observations, particularly the Origin of the Injection into Veins, the Transfusion of Bloud, and the Parts of Generation," *Philosophical Transactions* 3 no. 35 (1668): 672-682.

[113] A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 4, xxi.

[114] Denis, "An Extract Of a Printed Letter," 710-715.

[115] News of the Italian book claiming precedence came to Oldenburg from Jean Gallois, editor of the *Journal des Sçavans*. He admitted that this book lent a greater antiquity to the practice than he had been willing to previously admit, but the technique was proposed by the author only to be mocked as far too dangerous. The Italian method involved the much more difficult and dangerous method of transfusing in/out of the arteries rather than the veins as the English and the French were doing. Oldenburg, "Of the Antiquity of the Transfusion of Bloud from one Animal to another," *Philosophical Transactions* 3 no. 37 (1668): 731-732.

[116] Anonymous, "A Letter Written by an Intelligent and Worthy English Man from Paris," 1075-1077.

attempted to use his position as editor to mediate the debate, albeit with limited success. As well, this debate reveals another important facet of the seventeenth-century scientific community, the tension between the perception of the international nature of the Republic of Letters and developing nationalist sentiment.[117] Despite Oldenburg's attempts to mediate the dispute fairly, he favoured English interests. The French in their turn, in the actions of both Denis and Gallois, claimed priority for such an exciting and possibly useful discovery. That the French had carried out the first trial of transfusion of blood from an animal to a human added fuel to the fire.[118] The entry of the Italian contender only emphasized the nationalist involvement in this dispute. This debate reveals that a tension existed between the utopian ideal of the international Republic of Letters and the more immediate reality of national scientific societies. On one hand, Oldenburg was required to defend priority of the work of (English) Fellows of the Royal Society. On the other, he desired to give everyone recognition for their work and to move beyond the contention of the debate to the more noble task of turning this new discovery to the benefit of mankind. As he explained to the readers of his journal:

> But whoever this Parent [of transfusion] be, that is not so material, as that all that lay claim to this Child, should joyn together their endeavours and cares to breed it up for the service and relief of humane life, if it be capable of it; And this is the main thing aimed at in this Discourse; not written to offend or injure any, but to give every one his due, as near as can be discerned by the *Publisher*.[119]

I agree with the other historians who have examined this issue that nationalism did play an important role in this debate. However, nationalist sympathies did not play an obvious role in most of the debates or priority disputes which took place during the period of this study.[120] As the dispute between Auzout and Hevelius revealed, merit as decided by consensus was more important than nationalism at other times. Indeed, even when arguments took place between English and non-English members of the Royal Society, merit and social standing within the community were often more important considerations than nationality.[121]

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[117] The role of nationalism in this debate has been discussed by A.R. Hall, M.B. Hall and Shapin. A.R. Hall and M.B. Hall, "The First Human Blood Transfusion," 465; Shapin, "O Henry," 420. For a sociological examination of the relationship between nationalism and priority disputes see: Merton, "Priorities," 296-297.

[118] Whether or not any blood was actually transferred from the animal to the human recipient remains an open question. A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 4, xxi.

[119] Oldenburg, "More Tryals," 524-525.

As this analysis has shown, the *Philosophical Transactions* can reveal a great deal about the seventeenth-century scientific community, its doings and its interactions. The community seen in the pages of the *Philosophical Transactions* was an international one composed of men with similar educational backgrounds engaged in natural philosophical pursuits and included members from across Europe, though most were British. It was a community that existed in a state of tension between the ideal of an international Republic of Letters and the reality of being composed mostly of local groups with a desire to defend their own interests. Utilizing his dual role as Secretary of the Royal Society and as publisher of the *Philosophical Transactions*, Oldenburg created a journal that has affected the nature of printed scientific discourse to this day. The journal interacted with the community on several levels. The interests of the community made themselves felt in the pages of the journal and the journal in turn encouraged research in particular subjects. Under the guidance of Henry Oldenburg, the *Philosophical Transactions* very quickly developed into a site in which members of the scientific community could carry out public debates. Indeed, the number of letters sent to Oldenburg to be extracted for publication in the journal swiftly increased.[122] At first, as the Hevelius-Auzout debate has shown, Oldenburg actively encouraged debates among his correspondents which he then published in the *Philosophical Transactions*. He also tried to establish the journal as an impartial third-party that could be trusted to mediate such disputes. From this beginning, the journal quickly gained a reputation in its own right as a place to argue disputes and publicly defend oneself and one's ideas. Nor was the forum restricted to members of the Royal Society or to illustrious members of the scientific community. Other learned individuals could join in or create debates in their own right. The *Philosophical Transactions* was developing into an important forum for scientific communication and discussion in England and in the rest of Europe. The journal also quickly came to be seen as a place to publish to ensure public recognition and priority of discovery and as a forum in which debates about priority could be pursued. The *Philosophical Transactions* became an important communication and publication nexus for an international community of scientists, a nexus that both responded to the needs of the community that it served and helped to shape its interests and development.

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[120] For an example of an earlier case in which nationalism and the regional structures of scientific communities affected the reception of a new discovery see: Steven Pumphrey, "'O tempora, O magnes!' A sociological analysis of the discovery of secular magnetic variation in 1634," *The British Journal for the History of Science* 22 (1989): 181-214.

[121] The debate between Gregory and Huygens will be examined in chapter 4. In Huygens and Hooke's dispute over the ownership of the pendulum watch, which took place in 1675 outside of the period of this study, Hooke only raised the nationalist question when it seemed like he might not be granted patent rights. Iliffe, "In the Warehouse," 41-52.

[122] A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 4, xxiii.

Chapter 3:
The *Journal des Sçavans*

> Le dessein de ce Iournal estant de faire sçavoir ce qui se passe de nouueau dans la Republique des lettres .... Le seul denombrement des choses qui le composeront pourroit suffire pour faire connoistre l'vtilité. Mais i'adiousteray qu'il sera tres aduantageux à ceux qui entreprendront quelque ouurage considerables puis qu'ils pourront s'en seruir pour publier leur dessein, & inuiter tout le monde à leur communiquer les manuscripts, & les pieces fugitiues qui pourront contribuer à la perfection des choses qu'ils auront entreprises.[1]

With these words Denis de Sallo introduced the first learned journal to the Republic of Letters January 5, 1665. Unlike the *Philosophical Transactions*, the *Journal des Sçavans* underwent a long developmental period from the time that the first *privilège* for an intellectual journal was granted to François Eudes de Mézeray to when it actually appeared in print under the editorial control of Denis de Sallo.[2] The *Journal des Sçavans* was also subject to several levels of institutional and legal controls. For example, it was regulated by government censors and censured by its secular and religious readers. Indeed, this censorship resulted in the suppression of the *Journal des Sçavans* at the end of March 1665. Using an analysis of the contents of the *Journal des Sçavans*, this chapter will describe the nature of the French intellectual community that the journal served and outline its interests. In particular, the relationship between the journal and the French natural philosophical community, which was undergoing significant change in the wake of the creation of the Académie des Sciences, will be examined. The contents of the *Journal des Sçavans* reveal how the community selectively used the journal as a place to learn about the publication of new material but not as a place for the primary publication of their own work, except under exceptional conditions. The scientific contents of the journal show how the journal was affected by religious and political concerns and also illustrate the limited role that the journal played in the communication of natural philosophical information in seventeenth-century Paris. From its advent, the *Journal des Sçavans* was not designed to be a nexus for the communication of scientific information. Nor, apparently, did the community wish it to become one, for its format remained the same even after the editors changed. Rather, the *Journal des Sçavans* was designed as what we would now term a review journal and it was that role that the intellectual community appears to have desired it to fill.

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[1] Denis de Sallo, "L'Imprimevr av Lectevr," *Journal des Sçavans* 1 no. 1 (1665): i.

[2] Birn, "Le Journal," 16; Brown, "History," 366-368; Katzen, "Changing Appearance," 184; Kronick, "Printing History," 224; Morgan, *Histoire*, 39-45; Sainte-Beuve, *Causeries*, vol. 8, 226-228; Weld, *History*, vol. 1, 148-149.

The idea of creating an intellectual journal had been circulating in Paris for some time before the creation of the *Journal des Sçavans*. Interestingly, all three of the individuals who would be the most closely tied to the development of the intellectual journal were well known to one another. Mézeray and Sallo shared a house together in Paris and Gallois later lived in Sallo's household.[3] Mézeray applied for and received the first *privilège* to publish an intellectual journal in 1663.[4] However, the proposed journal never made it into press.[5] Because we know the proposed contents of Mézeray's journal and have an early description of the intended format of the *Journal des Sçavans* as well as articles written by the two editors discussing their intentions, we can trace the development and evolution of the intellectual journal in France. Mézeray, a historian by trade, had been a member of the committee involved in overseeing Renaudot's *Gazette* and was familiar with the production of a public affairs journal.[6] His proposed journal would have reported on developments in the sciences and the arts on a weekly basis but he would also be restricted from judging or reflecting upon ethics, religion or politics.[7] As the *privilège* reads:

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[3] Unfortunately the relationship among these three men has not been properly studied. The only mention of it that I have found in the literature is by Brown and he did not make it clear whether Mézeray, Sallo, and Gallois ever shared a house at one time or whether Sallo lived sequentially first with Mézeray and then with Gallois. Nor did he discuss their relationship in any detail. Charles Gillispie, ed. *Dictionary of Scientific Biography*, s.v. "Sallo, Denys de," by Harcourt Brown, 85; Brown, "Learned Journal," 368.

[4] A copy of the *privilège* appears in Sainte-Beuve, *Causeries*, vol. 8, 227-228.

[5] Birn, "Le Journal," 16; Katzen, "Changing Appearance," 184; Morgan, *Histoire*, 43-45.

[6] Brown, "History," 366.

[7] *Ibid.*, 367.

> il ait la liberté de faire aucun jugement ni réflexion sur ce sera de la morale, de la religion eu de la politique, et qui concernera en quelque sorte que ce puisse être les intérêts de notre État ou des autres princes chrétiens.[8]

Information in the journal was to have been gathered by the editor with the help of personal assistants and foreign correspondents and would include a list of books published throughout Europe.[9] In Harcourt Brown's opinion, the new journal would have emphasized reporting the sciences over the arts.[10] I am not certain that there is sufficient information to make this case. In any event, reporting on publications was not intended to be the journal's primary goal.

Mézeray's journal never developed past the planning stages but the idea of a journal continued to be mooted by the Parisian intellectual community. By the time Oldenburg's new French correspondent, likely Adrien Auzout, gave him a description of the new journal that would soon appear, it had changed dramatically from the one proposed by Mézeray. As it was described by Oldenburg's correspondent in the fall of 1664, the journal would first concern itself with reporting on new books and then with describing new discoveries in the arts and the sciences. Biographies too were now to be included, along with accounts of famous academies, libraries, and personal cabinets of curiosities. Interestingly, the proposed journal was to report on disputes between learned men and print 'good questions' that presented themselves before they could be otherwise published. The decisions of the ecclesiastical and secular courts would be reported along with anything extraordinary occurring in the Republic of Letters that might be of interest to the readers.[11]

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[8] Sainte-Beuve, *Causeries*, vol. 8, 228.

[9] *Ibid.*, 227-228.

[10] Brown, "History," 368.

[11] This extract appears in a letter which Oldenburg sent to Boyle November 24, 1664. The excerpt as quoted by Oldenburg reads: "I. tous les livres, qui sont inprimés depuis l'annee 1664. et ceux qui s'inprimeront à l'advenir, soit qu'ils soient inprimés de nouveau, ou qu'ils soyent reinprimés sur quelque ancienne Edition. 2. Toutes les Experiences et nouvelles descouvertes, qui se font dans tous les Arts et toutes les sciences, Physique, Astronomie, Chymie, Medicine etc 3. Le nom et les qualités des personnes, qui excellent en toutes sortes de sciences et arts, les ouvrages qu'ils on faits, et ceux qu'ils se proposent de faire; la mort de gens de lettres de quelque reputation: les choses principales de leur vie avec le catalogue de tout ce qu'ils auront donné au public, pour en pouvoir composer l'Eloge. 4. les

When the *Journal des Sçavans* finally appeared in January of 1665, the proposed design of its contents had once again changed significantly.[12] As Sallo wrote, "le dessein de ce Iournal estant de faire sçavoir ce qui se passe de nouueau dans la Republique des lettres."[13] The *Journal des Sçavans* would primarily catalogue and review "des principaux livres qui s'imprimeront dans l'Europe" in an unbiased way, although as the editor he warned readers that they might very well find opinions within the pages of the journal with which they would disagree.[14] The original design to provide biographies was dropped and the plan to provide elegies and catalogues of the works of deceased scholars moved into second position.[15] Descriptions of experiments in chemistry and physics and new discoveries in the arts and sciences dropped from second position into third, and news from the law court rounded out the list of topics to be covered in the journal. The idea of using the journal to report on debates within the community which had not yet been published was dropped entirely, as was the publication of good questions. Instead the journal would be used only to report on published material and court decisions. The usefulness of the *Journal des Sçavans* was emphasized, especially its practice of reviewing books. Conventional booksellers just provided a catalogue of new books. By reviewing books, the journal sought to increase its utility to its readers by letting them peruse the contents of books before purchasing them or by allowing those who did not wish, or could not afford, to purchase the books to have "une connoissance generale" of them.[16] When Gallois revived the *Journal des Sçavans* in 1666 he maintained the original published format. In his introduction, he apologized for the earlier reviews and promised "au lieu d'exercer sa critique, de s'attacher à bien lire

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Academies et Bibliotheques plus celebres, et ce qu se trouve de rare et de beau dans les Cabinets des personnes curieuses. 5. Les contestations, qui surviennent entre les scavans, et les belles questions, qui se peuvent presenter devant mesme qu'on en ait rien escrit. 6. les decisions les plus notables des tribunaux Ecclesiastiques et seculiers. Enfin tout ce qui se passe d'extraordinaire dans la republique les lettres, et qu'on jugera digne dela curiosité de ceux, qui font profession d'estude." Oldenburg, *Correspondence*, vol. 2, 320.

[12] Sallo, "L'Imprimevr," i-ii.

[13] *Ibid.*, i.

[14] *Ibid.*, i-ii.

[15] *Ibid.*, i.

[16] *Ibid.*, ii.

les Liures pour en pouuoir rendre un compte plus exact qu'on n'a fait iusq'à present."[17] He too emphasized the utility of the journal for its readers.[18]

The final format of the *Journal des Sçavans* was considerably different than that first envisioned by Mézeray and Sallo. The major change was making the journal primarily responsible for reviewing literature rather than reporting on immediate developments in the arts and sciences. Why this alteration occurred is uncertain. It may have been due to the influence of the Académie des Belles Lettres et Inscriptions or of the printer Jean Cusson.[19] In any case, the change appears to have been a popular one. Although the opportunity existed to alter the format of the *Journal des Sçavans* after its suppression, it remained the same. Indeed, if Gallois can be believed, it was sorely missed during the hiatus:

> Car tous les gens de lettres ont tesmoigné un extréme regret d'estre privez d'un Ouurage qui leur faisoit voir en racourcy ce qu'il y a de plus beau sans tous les livres, & qui leur donnoit en mesme temps beaucoup de plaisir par la diuersité des choses qui y estoient rapportées.[20]

The fact that the *Journal des Sçavans* continued to be published in much the same format for years to come attests to the fact that this was what its audience wanted in their journal: reviews of books covering a wide variety of topics.

The *Journal des Sçavans* was created under the auspices of the Académie des Belles Lettres et Inscriptions, otherwise known as the Petite Académie.[21] The Académie was Colbert's advisory body and worked under his direction. The first two editors of the *Journal des Sçavans*, Sallo and Gallois, were also consultants to the Petite Académie.[22] In addition to its primary role in the communication of intellectual information, the *Journal des Sçavans* was meant to serve the Petite

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[17] Gallois, "L'Imprimevr," v.

[18] *Ibid.*, v.

[19] Harcourt Brown tends towards the latter theory, "the business-like bookseller knew his public wanted literary news; that, although facts were interesting, there was already a reading public, anxious to know what was available in the bookshops." Brown, "History," 368.

[20] Gallois, "L'Imprimevr," v.

[21] Birn, "Le Journal," 17; Longnon, "Troisième Centaire," 7.

[22] Morgan, *Histoire*, 38; Hirschfield, "Académie," 5.

Académie's patron as a tool for the dissemination of propaganda, much as the *Gazette* had served his predecessor, Richelieu.[23] This objective was met through political commentary on news items and in book reviews and by selectively reviewing books written by members of the government or sympathetic to the government's position.[24] Denis de Sallo was granted a 20-year *privilège* to publish an intellectual journal on August 8, 1664.[25] The first issue of the *Journal des Sçavans* appeared January 5, 1665.[26] The journal was introduced to the intellectual community as a place in which to learn about everything new in the Republic of Letters.[27] The primary task of the *Journal des Sçavans* would be to catalogue and review the most important new books printed in Europe for the benefit of its audience.[28] Sallo further informed his readers that there was also a committee that helped him write the reviews for the journal and "comme plusieurs personne contribuent à ce Iournal, il est impossible qu'il soit fort vniforme."[29] The identity of the members of this working-group remains uncertain, although it is generally accepted that the journal's second editor, Jean Gallois, was one of them.[30] Thirteen issues of the *Journal des Sçavans* appeared under Sallo's editorship before the suppression of the journal in March 1665.

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[23] French journals were often used for propaganda purposes during the reign of Louis XIV. The Renaudot family's *Gazette* provides a good example of how the French government maintained control of the periodical press. In 1631 Théophraste Renaudot was granted an exclusive license to publish a mostly political journal by Richelieu. This *privilège* was held by the Renaudot family for generations. In return for their monopoly, the editors published pro-government articles and censored their own offerings. Klaits, *Printed Propaganda*, 58-60.

[24] *Ibid.*, 74-75. An excellent example of such a propaganda piece was Sallo's review of a publication of the Estates General of the Low Countries. Sallo, "Response des Estats Generaux des Provinces Unies des Pays bas, aux plaintes du Roy de la grande Bretagne. A la Haye. In 4°. en langue Flamande & Françoise," *Journal des Sçavans* 1 no. 6 (1665): 68.

[25] Brown, "Sallo, Denys de," 84.

[26] Sallo actually published the journal under a pseudonym, "Sieur de Hedouville." There are two main theories as to why he chose this course of action. The first holds that he took this name because he feared prosecution and the second believes that he did it to hide from criticism by his readers. At first he also asked that all correspondence be sent through the publisher. However, he later asked for it to be sent to his address, although still under the pseudonym. Morgan, *Histoire*, 64-66; Sallo, "L'Imprimevr Av Lectevr," i-ii; Sallo, "Advis pour une nouvelle Edition de Petrus Blesensis," *Journal des Sçavans* 1 no. 9 (1665): 107-108.

[27] Sallo, "L'Imprimevr," i.

[28] *Ibid.*, i-ii.

[29] *Ibid.*, ii.

[30] This is one of the areas of the journal's history about which very little historical evidence exists. The one contemporary list of possible contributors that exists was written by Guy Patin, one of the most vehement critics of Sallo's editorial style. This list was excerpted in Morgan's book and she discussed those who she felt were likely candidates. Later scholars tend to use either Patin's or Morgan's lists. Morgan, *Histoire*, 66-71.

The periodical press in seventeenth-century France was highly regulated and, despite its close association with the Académie des Inscriptions et Belles Lettres and Colbert, the *Journal des Sçavans* was no exception. Generally, control was maintained over the publication of journals by the granting of exclusive *privilèges* to specific individuals or families for the publication of a clearly defined type of periodical.[31] Besides meeting the primary mandate outlined in their *privilège*, most journals also played a secondary role serving as an outlet for government propaganda and policies as perceived by their governmental patron.[32] In addition to having to please their political patrons, journal editors had to take care not to run afoul of the strict rules governing the censorship of printed material or to offend influential individuals or groups.[33] Rousing political or religious ire could result in the removal of the *privilège* or the suppression of a journal, and this happened to the *Journal des Sçavans*.

The *Journal des Sçavans* was suppressed in March 1665 after its thirteenth issue. The reasons behind the suppression of the *Journal des Sçavans* are uncertain, since there are no public records extant concerning the issue. Additionally, the single existing letter from Sallo to Colbert mentioning the issue is of dubious authenticity.[34] Three factors have been suggested for the halt in the publication of the journal and end of Sallo's editorship. During the short existence of the *Journal des Sçavans*, Sallo had already found himself embroiled in two very serious affairs. The first of these involved the very pro-Gallician Church statements he made in some of his reviews.[35] Although these convictions were not unusual, and indeed it is not unlikely that the government may have held similar beliefs, the strong wording and public nature of these attacks led to a Jesuitical backlash.[36] Sallo also managed to offend the very powerful Guy Patin with his critical and, Patin believed, libelous review of his son's book on ancient medals.[37] The suggestion that Patin's enmity was instrumental in the suppression of the *Journal des Sçavans* has long been considered by historians.[38] The third possibility was that Sallo had become bored with this endeavour or decided to retire for personal reasons.[39] As no records remain, any conclusions must be drawn from circumstantial evidence. Morgan believes that it was a combination of all three factors; I believe that the first two causes far outweighed the third.[40] The external political and religious influences that affected the *Journal des Sçavans* under Sallo also played a significant role in the choice of the second editor and in his actions. The journal's second editor took care not to become involved in the same sorts of disputes as had his predecessor.

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[31] Klaits, *Printed Propaganda*, 58-59.

[32] *Ibid.*, 74.

[33] In the eighteenth century the roles of editor and journalist were often combined, resulting in a level of self-censorship of the contents of the journal which existed in tension with the desire for the free transmission of knowledge in the Republic of Letters. Goldgar, "The Absolutism of Taste: Journalists as censors in 18th-century Paris," in *Censorship and the control of print in England and France 1600-1910*, ed. Robin Myers and Michael Harris, (Winchester: St Paul's Bibliographies, 1992), 88-99.

[34] The form and style of the letter was very unlike Sallo's usual writing. Morgan, *Histoire*, 85-88.

[35] Two of Sallo's most virulent attacks on the Rome-centered nature of the Catholic Church occurred in the second issue of the *Journal des Sçavans*. The first was his review of the November 17, 1664

The journal was revived in 1666 at the order of Colbert and the abbé Jean Gallois was chosen to succeed Sallo, likely because he was more easily persuaded to avoid controversial issues and opinions.[41] When Gallois took over the editorship, his first act was to reaffirm the journal's intention to benefit the glory of the king.[42] He then bowed to general concerns and asserted that under his editorship the role of the

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Papal Index in which he decried Roman attempts to control what the French could and could not read, particularly since they had the Sorbonne to make such rulings locally. The second was his account of a trial concerning a possibly consanguineous marriage where he aired similar views. Sallo, "Decretum Sacrae Indicis Congrationis, quo damnati, prohibiti, ac respective suspensi fuereunt infrascripti omnes libri. Romæ, 17 Novembris 1664," *Journal des Sçavans* 1 no. 2 (1665): 13-15; Sallo, "Arrest Rendu a la Grande Chambre l'unsiéme jour de Decembre 1664," *Journal des Sçavans* 1 no. 2 (1665): 23-24.

[36] For the classical version of the *Journal des Sçavans'* problems with the Jesuits see Morgan, *Histoire*, 82-84.

[37] Sallo, "Introduction a l'histoire par la connoissance des Medailles, par Charles Patin. A Paris chez Iean du Bray & Pierre Varriquet, ruê S. Iacques. In 12°," *Journal des Sçavans* 1 no. 8 (1665): 87-88; Sallo, "Lettre d'un Amy de Monsieur Patin, sur le Iournal des Sçavans du 23. Fevrier 1665. A Paris chez Variquet, ruë S. Iacques," *Journal des Sçavans* 1 no. 10 (1665): 118-120.

[38] For a discussion of the major historians who agreed with this version of events beginning with Fontenelle in 1703 see: Morgan, *Histoire*, 84-85.

[39] For a discussion of this possibility see Morgan. The main piece of evidence here, besides hearsay, was a single letter purportedly written from Sallo to Colbert resigning his post. However, the letter was undated and its terse style is apparently quite unusual for Sallo. *Ibid.*, 86-88.

[40] *Ibid.*, 88-90.

[41] *Ibid.*, 127-128.

[42] Gallois, "Av Roy," *Journal des Sçavans* 2 no. 1 (1666): i-iv.

Journal des Sçavans would return to merely reviewing books carefully and not judging them:

> Il y a pourtant eu quelques personnes qui se sont plaintes de la trop grande liberté qu'on s'y donnoit de iuger de toutes sortes de Livres. ... Aussi est on resolu de s'en abstenir à l'advenir, & au lieu d'exercer sa critique, de s'attacher à bien lire les Livres pour en pouuoir rendre un compte plus exact qu'on n'a fait iusqu'à present.[43]

In addition, the number of books written by Jesuits reviewed, generally favorably, by the *Journal des Sçavans* increased dramatically under Gallois' editorship. Indeed, his contemporaries feared Jesuitical interference in the affairs of the journal. In writing to Oldenburg on November 28, 1668, Justel gave his opinion of the new journal:

> I am sending you the latest *Journal*. It seems that Mr. Gallois intends to make it appear regularly again. It is not as good as it was, and it is almost impossible for an ecclesiastic to do anything much when he must observe the proprieties and will dare say nothing offensive to the Roman religion or the Papal Court.[44]

The suppression of the *Journal des Sçavans* may not have affected the basic format of the journal, but it did affect its contents. To avoid the fate of his predecessor, Gallois took a conciliatory approach and seems to have actively avoided embroiling the *Journal des Sçavans* in anything that could be controversial.[45]

Gallois apparently also had a group of individuals, including Sallo, helping him with the journal, at least in the early years of his editorship.[46] Under his control the journal was published very regularly in 1666, but increasingly irregularly in the following years.[47] Gallois' work on the journal was affected by his increasing involvement in outside affairs. He was appointed to the position of Secretary of the Académie des Sciences in 1667, a position that he curiously did not use to his advantage when it came to publishing natural philosophical material in the journal. Because of Gallois' position as Secretary to the Académie des Sciences, the *Journal des Sçavans* has sometimes been closely associated with the Académie and has been called its official organ of publication.[48] Although this opinion has been echoed by later scholars, like Hirschfield, there is no evidence that the Académie ever considered the journal an outlet for its publications.[49] In fact only seven articles that can be traced back to the Académie des Sciences appeared in the *Journal des Sçavans* during the five years of this study.[50] In addition to his tasks as Secretary of the Académie, Gallois was also increasingly involved with serving Colbert directly and with other affairs.[51] Because of his additional duties, or perhaps because of failing interest, the number of issues of the *Journal des Sçavans* produced under Gallois' editorship declined steadily until he resigned in early 1674 to be succeeded by the abbé de la Roque later that same year.[52]

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[43] Gallois, "L'Imprimevr av Lectevr," *Journal des Sçavans* 2 no. 1 (1666): v.

[44] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 180.

[45] This is especially apparent when one considers what kind of astronomical information Gallois saw fit to publish in the *Journal des Sçavans* and will be more fully discussed later in this chapter.

[46] Morgan, *Histoire*, 135-136.

From an analysis of the contents of the *Journal des Sçavans* we can learn a great deal about the French Republic of Letters and its interests. Ascertaining the composition of the readership of the journal is difficult in part because very little publishing information on the journal has survived to the present. The style of the *Journal des Sçavans* adds to the difficulty. The anonymous nature of the articles means that information cannot be gathered on their authors and since readers were not encouraged to contribute to the journal we cannot learn about the community through that approach. Fortunately, in their introductory comments, the editors of the

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[47] There were forty-two issues published in 1666, sixteen in 1667, thirteen in 1668, and four in 1669. Outside the period of this study only one issue was published in 1670, three in 1671, eight in 1672, none in 1673 and only a single issue again in 1674. *Ibid.*, 137.

[48] *Ibid.*, 157.

[49] Hirschfield, "Academie," 21. For a history and discussion of the licit publications of the Académie's doings see Kronick, *Scientific & Technical Periodicals*, 140-145.

[50] The relationship between the Académie des Sciences and the *Journal des Sçavans* will be dealt with in some depth later in this chapter.

[51] Morgan, *Histoire* 137-140.

[52] *Ibid.*, 174-176.

Journal des Sçavans offer us some clues about the readers of the journal. Sallo describes his readers as "Gens de lettres" who would be interested in knowing "ce qui se passe de nouueau dans la Republique des lettres."[53] It is also evident that the journal was being marketed towards educated members of the book-buying and reading public.[54] Gallois too described the journal's readership as "les gens de lettres" and claimed that the journal played a role in "l'empire des Lettres."[55] The intended audience of the *Journal des Sçavans* was members of the Republic of Letters. They were individuals of some education and erudition with definite interests in learning about new books being published.

The interests of this general community, and of the editors, are also revealed by an examination of the contents of the journal. The *Journal des Sçavans* was primarily a bibliographic review journal. Approximately 78% of the articles in the journal were reviews of books or printed letters.[56] The journal reviewed mostly the latest French-published books and those printed in the rest of Europe that were available in Paris. Although the reviews were in French, the books reviewed were written in several languages. Most of the books were written in French or Latin but works in Greek, German, English and Italian were also examined. While the *Journal des Sçavans* reported on several subject areas, it concentrated on three main topics: history, religion, and natural philosophy.[57] Articles dealing with historical subjects made up approximately 30% of the contents of the journal. Religious and theological articles took up on average another quarter of the journal. These two areas consistently made up more than half of the contents of the journal under both editors. Two other subject areas underwent a great deal of change with the change of editors. Under Sallo, articles dealing with literary topics were the second most popular, making up 29% of all articles. They were considerably less popular under Gallois' editorship.[58] In the same fashion, articles on scientific topics were twice as popular under Gallois as they were under Sallo.[59] The remaining articles were scattered through a wide variety of subject areas. The changes that occurred between the editors in the number of literary and widely scientific articles reflects both a change in editorial interest and a change in opportunity. As Justel reported to Oldenburg when Sallo edited the *Journal des Sçavans*:

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[53] Sallo, "L'Imprimevr," i.
[54] *Ibid.*, ii.
[55] Gallois, "L'Imprimevr," v.
[56] The percentage book reviews per journal are as follows: Volume 1, 84%; Volume 2, 79%; Volume 3, 79%; Volume 4, 72%; Volume 5, 74%. For a comparison with the *Philosophical Transactions* see Appendix 1, General Information.
[57] See Appendix 3, Analysis of Interests in the *Journal des Sçavans*

> Those who manage our *Journal* are rather historians than philosophers; that is why you see nothing in it dealing with physics. Perhaps in time they will add that to it.[60]

Under Gallois' editorship the *Journal des Sçavans* was indeed expanded to include more articles on such subjects. In part this was because of Gallois' genuine interest in the sciences, but many of the articles dealing with scientific topics were excerpted from the *Philosophical Transactions* or the *Giornale de Letterati*.[61] Gallois concentrated on offering his readers a selection of articles detailing experiments or observations presented before the Royal Society.[62] He also included other articles on a wide variety of subjects but especially popular ones such as transfusion.[63] In fact,

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[58] Literary articles formed 18% of all articles in Volume 2 and 8% of all articles in Volumes 3 and 4. There were no literary articles in Volume 5.

[59] Scientific topics make up 10% of Volume 1, 29% of Volume 2, 24% of Volume 3, 22% of volume 4 and 21% of Volume 5.

[60] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 3, 12.

[61] In Volume 2, twenty articles were taken from the *Philosophical Transactions*. In Volume 3, five articles were from the *Philosophical Transactions*. In Volume 4 six articles were taken from the *Philosophical Transactions* and three were taken from the *Giornale de Letterati*. This means that the *Journal des Sçavans* began borrowing material from these journals very shortly after they began to be issued. There were no copied articles in Volume 5 but that volume contained only 4 issues with 19 articles in total so that is not particularly remarkable.

[62] See for example, Gallois and Henshaw, "Rosée de May," 27-28; Gallois and Robert Boyle, "Extrait du Iournal D'Angleterre, traduit de l'Anglois en François," *Journal des Sçavans* 2 no. 3 (1666): 40; Gallois and Robert Moray, "Extrait de Iournal d'Angleterre," *Journal des Sçavans* 2 no. 5 (1666): 65-66; Gallois and Silas Taylor, "Extrait du Iournal d'Angleterre. Nouvelle invention dont on se sert dans la Virginie pour tuer les Serpens à sonnettes," *Journal des Sçavans* 2 no. 9 (1666): 113-114.

[63] The *Journal des Sçavans* printed a large number of articles from the *Philosophical Transactions* regarding experiments in transfusion which it printed along with reviews of printed letters and articles drawn from letters as its coverage of the transfusion debate. The transfusion debate itself will be examined later in this chapter. For articles concerning transfusion reprinted in the *Journal des Sçavans* see: Gallois and Boyle, "Extrait du Iournal d'Angleterre. Contant la Maniere de Faire passer le sang d'un animal dans un autre," *Journal des Sçavans* 3 no. 3 (1667): 31-36; Gallois and Fabritius, "Extrait du

Oldenburg remarked on this when discussing the *Journal des Sçavans* in his correspondence to Boyle:

> [In] all their *Journaux des Scavans* from ye beginning of januar. last, till now; in most of wch I find, what is Philosphicall, to be taken out of our Transactions; ye rest being, generally, Extracts and Abbreviats of Theologicall, Historico-Politicall and such like Books.[64]

We cannot know for certain whether the percentage interests for given topics in the journal are an accurate reflection of the relative interest of the members of the Republic of Letters in those given areas. However, the broad range of interests revealed in the *Journal des Sçavans* was in step with the French intellectual community. The académies and salons where members of the Republic of Letters met discussed a wide variety of topics, from literature and history to politics and religion.[65] Even those académies most interested in natural philosophy, like Thévenot's in the period before the creation of the Académie des Sciences and Justel's and Bourdelot's afterward, included these topics in their meetings.[66] Indeed, Harriet Stone argues that the study of classical literature played an important role in the development of French science.[67] The *Journal des Sçavans* served the needs of an intellectual community with wide-ranging interests and it appears that its readership was reasonably pleased with the contents of the journal. Although there were some changes in the contents of the journal when Gallois succeeded Sallo as editor, the basic format of the *Journal des Sçavans* did not change. It continued to provide its readers with reviews of books covering a wide variety of topics. In its

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Iournal d'Angleterre, Contenant quelques nouvelles experiences de l'Infusion des Medicamens dans les veines," *Journal des Sçavans* 4 no. 1 (1668):10-12; Gallois, "Extrait du Iournal d'Angleterre, Contenant quelques experiences de la Transfusion," *Journal des Sçavans* 4 no. 2 (1668): 22-23; Gallois, "Extrait du Iournal d'Angleterre, contenant le succez des Experiences faites à Danzic, de l'infusion des Medicamens dans les viens de quelques personnes malades," *Journal des Sçavans* 4 no. 9 (1668): 108.

[64] Oldenburg, *Correspondence*, vol. 3, 48-49.

[65] De Boer, "Men's Literary Circles," 730-780.

[66] See Chapter 2.

[67] Harriet Stone, *The Classical Model: Literature and Knowledge in Seventeenth-Century France*, (Ithaca: Cornell University Press, 1996), 1-23. For historiographical information on the study of the ties between literature and science see xvi, especially note 14.

final form, the journal was designed to serve a generalist audience and it did so admirably. However, the general nature of the *Journal des Sçavans* also reinforced the idea that any learned individual must be knowledgeable in a variety of subjects that was so much part of educated Parisian *salon* society in the seventeenth and eighteenth centuries.

By examining the *Journal des Sçavans* we may also learn about the relationship between the journal and a subset of the general intellectual community, the French natural philosophers. During the period of this study the scientific community in France was in a state of flux. The older salons and académies which had served as gathering places for those with natural philosophical interests from a wide variety of backgrounds and skills were being replaced with government sponsored and run organizations with a selective, closed, and funded staff. In 1665, despite cries for government funding, the community was reasonably vibrant. There were several groups with natural philosophical interests meeting and experimenting in Paris, many of which were maintaining ties with provincial and foreign philosophers. However, this situation changed dramatically in 1666 with the formation of the Académie des Sciences. A small group of natural philosophers, among the best in the community, was chosen in a secretive and political fashion to form a paid assembly whose proceedings were silent. The wider community knew very little about the new group.[68] Even those chosen to be members of the new académie were kept in the dark about its purpose. As Auzout wrote to Oldenburg:

> Although I had the honor to be appointed by the King as mathematician and physicist [to the Académie des Sciences], I can't give you any more details than are known to everybody, because we have not been kept fully informed and things have not reached the point we were led to hope for.[69]

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[68] See for example Justel's comments to Oldenburg. Oldenburg, *Correspondence*, vol. 3, 134.

[69] As translated by A.R. Hall and M.B. Hall in *Ibid.*, 296.

The top-down creation of the Académie des Sciences served as a catalyst for the diminution of the scientific scene in Paris. Thévenot closed his academy, perhaps the most serious and prestigious one in Paris, in March after hearing about the creation of a new, royal, academy.[70] The fact that the patron of the new group was the Crown effectively stopped the creation of any sort of rival group under private patronage. Louis XIV had been working since 1661 to transform the Crown into the only major source of patronage in France and his actions actively warned others what the costs of building up an extensive retinue of clients could be.[71] The Parisian scientific community suffered a loss of vitality in the wake of the creation of the Académie des Sciences. Whereas before provincial scholars had joined in scientific life in Paris, they now felt distinctly unwelcome, as the experience of André Graindorge from Caen during a trip to Paris after the creation of the Académie des Sciences illustrates:

> Letters are in a profound silence on whatever side I turn. I am learning nothing new, and I would rather dissect a lobster or a shad with the rest of you than run about the streets here finding nothing.[72]

Indeed, David Lux credits the creation of the Académie with the destruction of the previously open Parisian scientific community and with changing the nature of the community in such a way that many of those who had previously been involved in scientific research had either left Paris or were no longer actively involved in research.[73] In sum, the Parisian scientific community was less vibrant after the creation on the Académie des Sciences than it had been beforehand. The *Journal des Sçavans* did nothing to change this state of affairs within the community. The majority of the journal was composed of book reviews. In this form the journal met the needs of the wider intellectual community, but it did not encourage communication within the scientific community. Sallo did not carry through his early intention to use the *Journal des Sçavans* as a sort of communications nexus where material gathered from foreign correspondents would be published along with scholarly debates and the very latest discoveries. The journal that was published concerned itself almost exclusively with book reviews and this ensured that it was not particularly seen as a place for the primary publication of scientific material.[74]

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[70] Lux, *Patronage*, 52.

[71] The arrest and trial of Nicholas Fouquet, the superintendant of finance, destroyed one of the last great private patrons in France. At his trial "his one unforgivable crime against the king has been simply to display too much wealth, too much ostentation, in his building program and his patronage." *Ibid.*, 54-55.

[72] Quoted in Lux, *Patronage*, 54.

[73] Lux, *Patronage*, 54-56.

The kind of scientific discoveries that could be published in the journal were also restricted by the political and religious situation in France. For example, no articles by French scholars dealing with planetary rotation or the elliptical motion of comets appeared in the *Journal des Sçavans* despite the fact that members of the French scientific community were working on these problems and publishing their results elsewhere, particularly in the *Philosophical Transactions*. The majority of articles appearing in the *Journal des Sçavans* on the motion of the comet of 1664/5 were written by Jesuits and followed the teachings of the Church involving cometary motion.[75] Morgan believed that the articles in the journal represented the cutting edge of astronomical thought as it was developing into an exact science.[76] If they were mistaken in their theories, if "les astronomes tombaient quelquefois dans des pièges," it was necessary so that their successors could discover the true path.[77] She seems to have been completely unaware that members of the French scientific community were already on that path. However, they were not publishing their potentially controversial results in the *Journal des Sçavans*. Instead they published their results privately or communicated them through correspondence, particularly to Oldenburg whom they knew would be likely to publish their work in his journal. None of the articles that Auzout published in the *Philosophical Transactions* on the motion of comets were excerpted in the *Journal des Sçavans* nor did reviews of his printed letters on the subject appear. A review of Hevelius' *Prodromus Cometicus* did appear in the journal, but he was not a French philosopher nor was his book published in France.[78] Furthermore, the *Journal des Sçavans* was all but silent on the debate between Auzout and Hevelius which had so prominent a place in the *Philosophical Transactions*. The single article mentioning the debate was a reprint of the English astronomers' decision that they agreed with Auzout's observations and did not involve an in-depth discussion of cometary motion at all.[79] All but one of the articles dealing with the rotation of planets about their own axes were either taken from the *Philosophical Transactions* or were reviews of foreign books.[80] The *single* exception to this trend occurred very early in Gallois' editorship of the journal. It involved the review of a printed letter of Auzout's on planetary rotation and was never repeated.[81] Indeed, in the following year, Gallois favourably reviewed a book written by a Jesuit which argued that the earth was stationary.[82] Clearly, the astronomical theories published in the *Journal des Sçavans* reflect the editor's desire not to anger the religious establishment rather than the state of French astronomy as a whole.

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[74] Exceptions to this general rule tended to be letters deliberately inserted into the journal in response to outside factors, like a debate or the publication of the results of a rival in the *Philosophical Transactions*. See chapter 4 below.

[75] Sallo, "De la Comete," *Journal des Sçavans* 1 no. 4 (1665): 49-50; Sallo, "Le Cours de la Comete, Avec un Traité de sa nature, de son mouvement & de ses effets. Presenté à Monseigneur le Prince par le Pere Grandamy, de la Compagnie de Iesus. A Paris chez S. Cramoisy, ruë S. Iacques. In 4°," *Journal des Sçavans* 1 no. 12 (1665): 137-138.

[76] Morgan, *Histoire*, 160.

[77] *Ibid.*, 161.

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[78] Gallois, "Ioh. Hevelii Prodromus Cometicus. In fol. Gedani 1665. Et se trouve à Paris chez Piget," *Journal des Sçavans* 2 no. 9 (1666): 110-113.

[79] Gallois and English Astronomers, "Extrait du Iournal D'Angleterre. Sentiment des Astronomers d'Angleterre sur la contestation arrivée entre deux sçavans hommes, touchant une observation faite de la premiere des deux derneres Cometes," *Journal des Sçavans* 2 no. 13 (1666): 160.

[80] Anonymous, "Extrait d'une Lettre Escrite de Rome, touchant les nouvelles decouvertes faites dans Iupiter per M. Cassini Professeur d'Astronomie dans l'Université des Bologne," *Journal des Sçavans* 2 no. 8 (1666): 99-102; Gallois and Robert Hooke, "Extrait du Iournal d'Angleterre, touchant la Planete de Mars," *Journal des Sçavans* 2 no. 20 (1666): 238; Gallois, "Martis Circa Axem Proprium revolubilis Observationes. Bononiæ à Io. Dommico Cassino habitæ. Romæ, 1666," *Journal des Sçavans* 2 no. 22 (1666): 259-262; Gallois and Hooke, "Extrait du Iournal d'Angleterre, Contenant les particularitez de quelques observations qui ont esté faites à Londres au mois de Fevrier & de Mars dernier touchant la planette de Mars," *Journal des Sçavans* 2 no. 34 (1666): 403-406; Gallois and Hooke, "Extrait du Iournal d'Angleterre, Contenant quelques nouvelles Observations faites à Londres touchant la Planete de Iupiter," *Journal des Sçavans* 2 no. 35 (1666): 416-417; Gallois and Hooke, "Nouvelle Observation touchant la Planete de Saturne, communiquée par le mesme," *Journal des Sçavans* 2 no. 35 (1666): 418.

[81] The letter mentioned Campani's observations of Saturn and Jupiter which confirmed Copernicus' ideas and condemned the inquisition. Auzout, "Lettre a Monsieur L'Abbé Charles, sur le Ragguaglio di nuove osservationi da Giuseppe Campani, par Adrian Auzout. A Paris chez Iean Cusson, ruë S. Iacques," *Journal des Sçavans* 2 no. 2 (1666): 21-24.

After Gallois was appointed Secretary of the Académie des Sciences the *Journal des Sçavans* became even less responsive to new events in the scientific world. The number of issues published per year declined dramatically. Large hiatuses occurred in which no issues were published at all. Justel commented upon the gaps in publication in his correspondence with Oldenburg.[83] Oldenburg's correspondence also reveals the feeling in at least part of the European scientific community that the quality of the journal suffered as well. Justel commented upon this at least twice. On October 24, 1668, he wrote to Oldenburg: "I am sending you the *Journal*, which, to tell you the truth, is not much. The editor claims to produce one every two weeks. No one counts on it any longer. I shall send it to you regularly if you think it worth your attentions."[84] The next month he wrote again to Oldenburg: "I am sending you the latest *Journal*. It seems that Mr. Gallois intends to make it appear regularly again. It is not as good as it was."[85] Denis too complained about the *Journal des Sçavans*. He said in his letter: "The French *Journal* goes on very languidly, which puts me in a greater hurry to have yours [the *Philosophical Transactions*]."[86] Even Francesco Nazari, in his first letter to Oldenburg, remarked on the dearth of scientific content in the *Journal des Sçavans*:

> We have in some measure had a taste of these things [reports of scientific observations and experiments] in the French *Journal*, but so slight a one that it has rather aroused our thirst than satisfied it.[87]

The fact that the Académie des Sciences failed to utilize the *Journal des Sçavans* as a place in which to publish its work, either before or after Gallois became Secretary, contributed to the dearth of scientific material in the journal. The Académie did not

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[82] Gallois, "Astronomia Reformata Auctore P. Ioanne Babt. Ricciolo Soc. Iesu. In fol. Bononiæ. Et se trouve à Paris chez Piget," *Journal des Sçavans* 3 no. 2 (1667): 13-17.

[83] See for example letters 622, 881, 898, 904, 965, 976, and 1014 in Oldenburg, *Correspondence*, vol. 3, 369; Oldenburg, *Correspondence*, vol. 4, 452-453, 484-485, 499-502; Oldenburg, *Correspondence*, vol. 5, 62-65, 85-87, 179-180.

[84] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 87.

[85] *Ibid.*, 180.

[86] *Ibid.*, 415.

[87] *Ibid.*, vol. 6, 259.

often publish the results of its work at all, although when it did those books were duly reviewed in the *Journal des Sçavans*.[88] Even when the Académie did publish material in this early period, it did not do so under its proper name. Instead, the publications were described as the work of the group that met in the King's Library. In addition to the four books reviewed in the journal, three other articles concerning the Académie des Sciences appeared in the *Journal des Sçavans* within the period of this study. One article was a letter extract, another an extract from the group's mathematical register, and the third an article on hydraulics.[89] The last two articles were the only cases in which Gallois may possibly have made use of his position as Secretary of the Académie to find articles for his journal. The high hopes that natural philosophers had once had for the *Journal des Sçavans* were for the most part destroyed during the second and third years of Gallois' editorship. The journal was published increasingly infrequently and Gallois did not use his position as Secretary of the Académie des Sciences to his benefit as editor of the *Journal des Sçavans*. Rather his new positions and duties drew him away from his editorial work and the journal suffered for it.

Moreover, the *Journal des Sçavans* did not take a particularly interactive role with the scientific community. Those scientific debates that did appear in its pages tended towards the literary. For example, in the second volume there was a debate over the translation and meaning of a certain passage of Pliny's concerning eclipses.[90]

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[88] Gallois, "Relation d'Une Observation Faite a la Bibliotheque du Roy à Paris le 12. May, d'un Halo ou Couronne à l'entour du Soleil; avec un discours de la cause de ces Meteores & de celle des Parelies. In 4°. A Paris chez Iean Cusson," *Journal des Sçavans* 3 no. 12 (1667): 150; Gallois, "Observations Faites sur un Grand Poisson dissequé à la Bibliotheque du Roy, le 24. Iuin 1667. A Paris chez Fred. Leonard," *Journal des Sçavans* 3 no. 13 (1667): 157-160; Anonymous, "Extrait d'Une Lettre Ecrite à Monsieur de la Chambre, qui contient les Observations qui ont été faites sur un Lion dissequé à la Bibliotheque du Roy le 28. Iuin 1667. In 4°. A Paris chez Fred. Leonard," *Journal des Sçavans* 3 no. 14 (1667): 171-174; Gallois, "Description Anatomique d'un Caméleon, d'un Castor, d'un Dromadaire, d'un Ours, & d'une Gazelle. In 4°. A Paris, chez Fred. Leonard," *Journal des Sçavans* 5 no. 4 (1669): 37-42.

[89] P, "Extrait d'une Lettre de M. P. à M. *** sur le suiet des Vers qui se trouvent dans le foye de quelques Animaux. Du 9. Iuillet," *Journal des Sçavans* 4 no. 6 (1668): 66-68; Gallois, "Extrait du Registre de Mathematique de la Compagnie qui s'assemble à la Bibliotheque du Roy. Observation de l'Eclipse horizontale de Lune, arrivée le 26. iour du mois de May dernier," *Journal des Sçavans* 4 no. 6 (1668): 69-72; Gallois, "Construction d'Une Machine Hydraulique inventée par M. de Francini," *Journal des Sçavans* 5 no. 4 (1669): 46-48.

[90] Gallois, "Deux Eclipses en l'Espace de 15 iours dechiffrées par le P. Grandamy de la Comp. de Iesus. A Paris chez Seb. Mabre-Cramoisy. In 4°," *Journal des Sçavans* 2 no. 23 (1666): 269-270; Pierre Petit,

Although this debate did concern a scientific topic, the more serious debates were saved for private publication, correspondence or publication in the *Philosophical Transactions*. If a debate did appear in print then it might appear in the *Journal des Sçavans* through book or letter reviews. In one case, Gallois reserved most of one issue to reviews of debates on the possible efficacy of the transfusion of blood as a medical treatment.[91] These debates were actually being carried out among the participants in a series of printed letters circulating in Paris. Gallois first introduced the debate to the readers of the *Journal des Sçavans* by summing up previous discussions of the topic.[92] He then extracted or reviewed four letters on the subject.[93] The few exceptions to this general rule regarding debates tended to be articles that entered the *Journal des Sçavans* in response to debates being carried out in the *Philosophical Transactions*.[94] Furthermore, the journal was not used as a place to request or gather information either for individuals or for groups. Neither individual natural philosophers nor the Académie des Sciences published articles requesting information for research projects in the *Journal des Sçavans*. The only requests that

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"Extract d'Une Lettre de Monsieur Petit Intendant des Fortifications, à Monsieur Galloys Prestre, sur l'Eclipse de Lune de 16. Iuin; & sur un passage de Pline restitue à ce propos," *Journal des Sçavans* 2 no. 25 (1666): 295-298; R. P, " Extrait d'Unde Lettre du R.P. l'Abbe de la Compagnie de Iesus touchant le passage de Pline dont il est parlé dans le Iournal precedant," *Journal des Sçavans* 2 no. 26 (1666): 308-310; Petit, "Billet de M. Petit Intendant des Fortifications touchant le mesme passage de Pline dont il est parlé dans le Iournaux precedans," *Journal des Sçavans* 2 no. 27 (1666): 320-322.

[91] This debate took place in the February 6, 1668 issue of the *Journal des Sçavans*. By this time several articles concerning blood transfusion had already appeared in the May, June, September, and October 1667 issues of the *Philosophical Transactions*.

[92] Gallois, "Diverses Pieces Touchant la Transfusion du sang," *Journal des Sçavans* 4 no. 2 (1668): 13-14.

[93] Gallois, "Lettre de G. Lamy A M. Moreau Docteur en Medicine de la Faculté de Paris, contre les pretenduës utilitez de la Transfusion. In 4°. A Paris chez Iean de Launay," *Journal des Sçavans* 4 no. 2 (1668): 14-16; Gallois, "Seconde Lettre Ecrite a M. Moreau Docteur en Medicine de la Faculté de Paris par G. Lamy, pour confirmer les raisons qu'il a apportes dans sa premiere Lettre contre la Transfusion. In 4°. A Paris chez Iean de Launay," *Journal des Sçavans* 4 no. 2 (1668): 19-20; Gallois, "Lettre de C. Gadroys a M. l'Abbé Bourdelot Docteur en Medec. de la Facluté de Paris, pour servir de Reponse à la Lettre écrtite par M. Lamy contre la Transfusion. In 4°," *Journal des Sçavans* 4 no. 2 (1668): 16-19; Gallois, "Lettre de G. de Gurye Sr de Montpolly à M. l'Abbé Bourdelot Docteur en Medicine de la Faculté de Paris, touchant la Transfusion. In 4°. A Paris chez Iean Cusson," *Journal des Sçavans* 4 no. 2 (1668): 20-21.

[94] This aspect of the journal will be more fully examined in chapter four.

appeared in the journal were reprints of those previously published in the *Philosophical Transactions.*[95]

Priority disputes did occasionally occur in the journal. However, most of these disputes appeared in the context of book or letter reviews or as a response to claims made in the *Philosophical Transactions.*[96] For example, Huygens wrote a letter on the laws of motion of small bodies to Gallois to be published in the *Journal des Sçavans* in response to a letter published in the *Philosophical Transactions* regarding Wallis' and Wren and Rook's demonstration of similar laws before the Royal Society.[97] Huygens had communicated his discoveries previously to Oldenburg, and through him to members of the Royal Society, although not in publishable form.[98] He felt slighted that he had not been given due credit for his discoveries in the *Philosophical Transactions* and believed that he needed to respond to these articles. As he wrote to Gallois in a letter that was published in the *Journal des Sçavans* on March 18, 1669 [N.S.]:

> Vous aurez vû des regles semblables en substance à quelques vnes de celles-cy dans le dernier Iournal d'Angleterre: ce qui m'oblige de vous dire, afin de n'estre pas soupçonné d'auoir rien emprunté d'ailleurs, que i'ay fait part de mes regles à Messieurs de la Societé Royale d'Angleterre auant l'impression de celles-là. .... Ie pourrois vous allaguez vne possession encore bien plus ancienne de la connoissance de ces loix de la Nature, si ie n'apprehendois de vous donner

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[95] Gallois and Royal Society, "Extrait du Iournal D'Angleterre, contenant des instructions pour ceux qui ont à faire de longs voyages sur mer," *Journal des Sçavans* 2 no. 16 (1666): 193-196; Gallois and John Beale, "Extrait du Iournal d'Angleterre, contenant diverses experiences touchant la Petrification," *Journal des Sçavans* 2 no. 40 (1666): 476-478.

[96] For example, an extract from a letter, likely printed, by Denis in which he not only discusses his own experiments on the transfusing of blood between dogs but claims that he did so before the experiments discussed in the *Philosophical Transactions*. Denis, "Extrait d'Une Lettre," 69-72.

[97] Wallis, "A Summary Account given by Dr. John Wallis, Of the General Laws of Motion, by way of a Letter written by him to the Publisher, and communicated to the R. Society, Novemb. 26. 1668," *Philosophical Transactions*, 3 no. 43 (1669): 864-866; Wren, "Dr. Christopher Wrens Theory concerning the same subject; imparted to the R. Society Decemb. 17. last, though entertain'd by the Author divers years ago, and verified by many Experiments, made by Himself and that other excellent Mathematician M. Rook before the said Society, as is attested by many Worthy Members of that Illustrious Body," *Philosophical Transactions*, 3 no. 43 (1669): 867-868.

[98] For the response of the Royal Society to Huygens' theories see Oldenburg, *Correspondence*, vol. 5, 373.

> d'aurant plus de sujet de me blâmer d'auoir été si long temps sans les communiques.[99]

This affair seems to have arisen out of some sort of misunderstanding. Oldenburg had written to Huygens several times requesting his theories on motion so that they could be compared to the work of English fellows who were considering the same subject.[100] Huygens did eventually send a package with some solutions to problems of percussive motion.[101] On January 11, 1669, Huygens' letter was read before a meeting of the Royal Society and entered into the Letter and Register Books.[102] Since all of the theories circulating were similar Oldenburg began working towards a consensus so that "this matter will at last be solidly digested and perfectly established."[103] Sir Paul Neile suggested at that same meeting that Wren's hypothesis on motion be printed in the *Philosophical Transactions* and Oldenburg agreed to do so.[104] He also published Wallis' theories and would have happily included Huygens' as well.[105] When he wrote to Huygens on February 4, 1669 to let him know that these articles on motion would be appearing in the *Philosophical Transactions* he explained:

> If I had had your permission, and if you had communicated a summary of all your reflections on the subject, I would have enriched this same number of the *Transactions* [vol. 3 no. 43] with them most willingly. .... I do not know whether I dare advise you to take the same route, that is to say to make public (as a harbinger)

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[99] Gallois, "Extrait d'Une Lettre de M. Hugens à l'Auteur du Iournal," *Journal des Sçavans* 5 no. 2 (1669): 24.

[100] Oldenburg first wrote to Huygens on October 26, 1668 and then again November 18, 1668. Oldenburg, *Correspondence*, vol. 5, 103-104, 176-178.

[101] Huygens promised to send the package to Oldenburg twice (on November 3, 1668 and December 26, 1668) before Oldenburg finally received it on January 4, 1669. Oldenburg, *Correspondence*, vol. 5, 126-128, 282-283.

[102] Birch, *History*, vol. 2, 337; Oldenburg, *Correspondence*, vol. 5, 331-333.

[103] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 332. See also: 336-337, 342-343

[104] Birch, *History*, vol. 2, 337.

[105] There seems to have been some suggestion at the following meeting, held February 1, 1669, that Huygens might "misinterpret" the publication of the articles. See Turnbull, ed., "Correspondence with James Gregory," in *James Gregory Tercentenary Memorial Volume*, ed. Herbert Turnbull (London: G. Bell & Sons, 1939), 65.

> a summary of your work on this subject. If by any chance you find this a suitable proposal, I can assure you that in case you should like to command me to put the result in our *Transactions*, I should do it not only with joy, but accompanied with an affidavit to the effect that, although it is published after the efforts of Messrs. Wallis and Wren, it was in my hands at the same time as those, and that you had your results several years ago now.[106]

Oldenburg was as good as his word and an article with those notes appeared as soon as Huygens had communicated the information to him in publishable form.[107] As these examples have illustrated, the main battleground for resolving priority disputes lay not in the pages of the *Journal des Sçavans* but elsewhere, either in dueling printed letters or books, correspondence, or the pages of the *Philosophical Transactions*. The relationship of the *Journal des Sçavans* to the scientific community was much the same as it was to the general learned community in Paris. The journal was, first and foremost, a place in which scientific books or printed letters were reviewed. Occasionally news from the scientific communities outside France appeared as articles reprinted from the *Philosophical Transactions* and the *Giornale de Letterati*. The *Journal des Sçavans* was not perceived to be the place to publish primary research or to carry out important debates. Although it was occasionally used for these purposes by members of the scientific community, the *Journal des Sçavans* never really developed as a forum for the exchange of ideas and certainly never formed a communications nexus for the broader community.

As this study has shown, the French conception of an intellectual journal underwent several changes before the *Journal des Sçavans* began publication in January 1665. The journal never reported weekly on the latest news in the arts and the sciences as Mézeray had first envisioned. Instead, the journal was designed to be useful to its audience in very specific ways. It reviewed the latest books available at

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[106] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 374.

[107] Christian Huygens, "A Summary Account Of the Laws of Motion, communicated by Mr. Christian Hugens in a Letter to the R. Society, and since printed in French in the Iournal des Sçavans of March 18. 1669. st. n.," *Philosophical Transactions*, 4 no. 46 (1669): 925-928.

French booksellers for its readers, provided them with occasional lay and ecclesiastical court judgments, and extracted other journals' articles to provide philosophical news from abroad. The intellectual community obviously approved of the type of information published by the *Journal des Sçavans* as it was missed by its readers during its suppression and remained essentially unchanged under both editors. At the same time, the journal was used by the government for propaganda purposes. As the suppression of the *Journal des Sçavans* revealed, the journal was affected by the political, social, and religious restrictions under which it operated. The choice of Gallois as the second editor and the changes that occurred in editorial style under his auspices illustrate just how significant an effect those factors could have on the journal and its contents. As the analysis has shown, the *Journal des Sçavans* was designed for a generalist audience, not one specifically interested in one field or another. Because of the anonymous articles and the review nature of the journal, the analysis of the contents reveals little about the nature of the community that it served. However, the *Journal des Sçavans* was marketed towards a discerning and educated portion of the reading public with a wide variety of interests. In this way, the journal reflected the nature of French intellectual life and likely helped to enforce the idea that general erudition was the hallmark of an educated individual. Understandably, the contents of the journal changed slightly with the editors, but history and religion remained the most popular topics, followed by science and medicine. The *Journal des Sçavans* served a limited role in the communication of scientific information. It was not generally used as a place in which to publish news of new discoveries, debate issues, or establish or debate priority of discovery. Rather the communications needs of the Parisian natural philosophical community were met by a combination of correspondence, books, printed letters and publication in the *Philosophical Transactions*. Natural philosophers used the *Journal des Sçavans* in the same fashion as the rest of the French intellectual community, as a place to read reviews of books and published letters.

Chapter 4:
Relations between the journals: The Gregory-Huygens Dispute

In 1668 a debate erupted which tested the rules that the scientific communities in England and France were developing to govern printed discourse. Since these rules were unwritten, it is only when they are broken that they may be examined. This dispute occurred between the well-known natural philosopher Christiaan Huygens and the young James Gregory; the cause was Huygens' review of Gregory's book. The debate between these two scholars took place in print. Huygens published his opinions of Gregory's work in the *Journal des Sçavans* and Gregory responded in the *Philosophical Transactions* and in a second book. Only part of the debate concerned the question of mathematical proofs. It was Huygens' accusations of plagiarism and Gregory's manner of reply that were the most hotly contested aspects of the dispute. The response of the international scientific community to their arguments and actions can be seen in Gregory's, Huygens', and Oldenburg's correspondence. This particular dispute is important for two reasons. It shows us that the *Philosophical Transactions* was well-known in continental Europe and that the contents of the *Journal des Sçavans* were being transmitted into England via Oldenburg. Secondly, it reveals that there were certain rules concerning the treatment of one's opponent in print that were followed by English and French natural philosophers. However, as this dispute illustrates, the reaction of the scientific community to the breaking of these rules varied according to several factors.

In 1667, James Gregory, a young Scottish mathematician, published a book entitled *Vera Circuli et Hyperbolae quadratura* in Padua, where he had been studying mathematics.[1] This book broke new ground in the field of mathematics. It was mainly concerned with methods for deriving logarithms from areas within and surrounding circles and hyperbolas.[2] On October 8, 1667, he sent a copy of the text to Christiaan Huygens along with a very polite letter requesting his opinion of the book.[3] At about the same time, a copy of the text also circulated among several English mathematicians, including Wallis and Brounker, with a request for their opinions.[4] Of the reviewers at least one, Wallis, replied to Gregory "in a familiar letter (of which I [Wallis] kept no coppy.)"[5] Oldenburg collected the opinions of the English readers and published a generally favourable review of the book on March 16, 1668 in the *Philosophical Transactions*.[6] Indeed, Gregory was elected a Fellow of the Royal Society on June 11, 1668 in recognition of his mathematical achievements.[7] In his letter Gregory did not clearly request that Huygens respond by correspondence rather than in print. However, since Wallis replied by letter before the review including his opinion was printed, this desire seems to have been understood. Gregory's supporter John Collins stated that this was indeed his intention:

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[1] James Gregory, *Vera Circuli et Hyperbolae Quadratura, in propria sua Proportionis specie inventa & demonstrata a Jac. Gregorio Scoto.* (Padua: 1667). M. Dehn and E. Hellinger, "On James Gregory's *Vera Quadratura*," in *James Gregory*, 468.
[2] Dehn and Hellinger, "*Vera Quadratura*," 468, 477.

> Mister Gregory being in Italy, A. 1667. publisheth a little book Intitul'd *vera Circuli et Hyperbolae Quadratura in propria sua Proportionis specie inventa et demonstrata*. He sends divers of these Books abroad to ye Mathematicians of Italy, and to Monsieur *Hugenius* also, desiring their judgement of it, before they wrote against it, yt might by private letters satisfy their doubts, before they should require any such thing in print.[8]

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[3] Huygens, *Oeuvres*, vol. 6, 154.

[4] We know this from a letter sent from Wallis to Brounker at the height of the debate. Wallis was concerned that the Royal Society not be drawn into mediating the disagreement. *Ibid.*, 282; Oldenburg, *Correspondence*, vol. 5, 138.

[5] Huygens, *Oeuvres*, vol. 6, 282; Oldenburg, *Correspondence*, vol. 5, 138.

[6] Oldenburg specifically listed Viscount Brounker and John Wallis among the reviewers. The review also includes a longer commentary by John Collins. Oldenburg, Henry. "An Account of two Books. I. Saggi di Naturali Esperienze fatte nell' Academia del Cimento, in Firenze, A. 1667. in Fol. II. Vera Circuli et Hyperbolæ Quadratura, in propria sua proportionis specie inventa & demonstrata, à Jac. Gregorio Scoto, Patavii in 4^{o}" *Philosophical Transactions* 3 no. 33 (1668): 640-644. Huygens, *Oeuvres*, vol. 6, 282-283; Oldenburg, *Correspondence*, 138.

[7] Hunter, *Royal Society*, 184-185.

[8] This appeared in a letter which Collins wrote to Robert Moray informing him of "the Sate of ye Controversy between Mr. Hugenius and Mr. James Gregory" which was sent along with another letter from Moray to Huygens in 1669. Huygens, *Oeuvres*, vol. 6, 369-376.

Regardless, Huygens did not respond directly to Gregory's letter but instead published a review of the book in the June 22/July 2, 1668 issue of the *Journal des Sçavans.*[9] Although Huygens acknowledged that the piece was of some importance, he was generally critical of Gregory's work.[10] Gallois also wrote a portion of the review. In his section he reported that Huygens had previously discovered and communicated a method for deriving the same equations to the Royal Society and the Académie des Sciences and implied that Gregory might have plagiarized this work.[11] Huygens criticized Gregory's mathematical work on three points: he did not believe that Gregory's method for finding limits was unique; he questioned Gregory's assertion that π was transcendental; and he showed that Gregory had made a mistake in his tenth proposition.[12] Gregory responded to Huygens' review shortly thereafter, defending his work on the three issues in a letter that was printed in the *Philosophical Transactions* on July 13, 1668.[13] Gregory's first reply to Huygens was temperate. He concentrated on Huygens' technical criticisms and did not respond to the accusation of plagiarism. Gregory's concluding comments reveal how pleased he was that Huygens had found his work not unworthy.[14] However, the accusation of plagiarism affected Gregory much more than was apparent at first.

During the summer of 1668 he wrote a short book, *Exercitationes Geometricae*, in which he published a small appendix to *Vera Quadratura* defending his work against Huygens' criticisms and accusations of plagiarism.[15] The language in the appendix of *Exercitationes Geometricae* was much more critical of Huygens. Gregory claimed that Huygens called him ignorant and accused him of plagiarism. He then counterattacked, saying that Huygens' work did not prove that his original points were incorrect: "Conatur hic tacitè *Hugenius* me ignorante & plagii accusare; sed non animadvertit se sibi contradicere."[16] Gregory said that if Huygens had invented the method, then he (Gregory) had brought it to such perfection in *Vera Circuli* that Huygens hardly recognized his own offspring:

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[9] Typically, the author of the review was not specified suggesting that it was perhaps written by Gallois. Because Huygens' contributions to the article appear in his *Oeuvres*, in this case we know which parts of the article were written by Huygens and which by Gallois. This example makes it quite clear that Gallois was receiving help in writing the articles for the journal, although we cannot know how significant that aid was. Gallois, "Vera Circuli et Hyperbolae Quadratura, in propria sua proportionis specie inventa & demonstrata à Iacobo Gregorio Scoto. In 4°. Patanii," *Journal des Sçavans* 4 no. 5 (1668): 52-56; Huygens, *Oeuvres*, vol. 6, 228-230, 231.

[10] E.J. Dijksterhuis, "James Gregory and Christiaan Huygens," in *James Gregory*, 479.

[11] The Académie des Sciences is once again referred to here as the group meeting in the King's library. The book was reviewed before the assembly. It is entirely possible that Gallois was present in his role as secretary which may explain his report on the discussion. Gallois stated that Huygens specifically said "qu'il croioit auoir donné quelque chose de plus precis dans le Liure intitulé *De Circuli magnitudine*, qu'il fait imprimer dés l'an 1654." Gallois, "*Vera Circuli*," 55.

[12] The A.R. Hall and M.B. Hall discuss this debate and the extent to which Huygens had grounds to criticize Gregory in Note 3 in letter 904 written by in Oldenburg, *Correspondence*, vol. 4, 504.

[13] Gregory, "Mr. Gregories Answer To the Animadversions of Mr. Hugenius upon his Book, De Vera Circuli & Hyperbolæ Quadratura; as they were publish'd in the Journal des Sçavans of July 2. 1668.," *Philosophical Transactions* 3 no. 37 (1668): 732-735.

[14] "inventa mea Hugenio non æstimari indigna" Gregory, "Mr. Gregories Answer," 735.

> At parum refert quis sit ejus primus inventor, satis enim constat me primum esse publicationem; neque mihi esset difficile affirnare (si modo mentiri vellem) me ante 20 annos illam cognovisse: utcunque sit, conabor hic Circuli & Hyperbolae quadraturam ad talem perfectionem promovere, ut *Hugenius* prolem suam vix cognoscat.[17]

The dating of the publication of *Exercitationes Geometricae* is critical to understanding the debate which followed. Unfortunately, scholars disagree on when exactly the book was written and published. Some scholars of Gregory's life claim that it was written during the summer and published in the winter of the 1668.[18] Others claim that it was not written until the fall of 1668.[19] The timing is critical, for on it rests the question of whether Gregory wrote the *Exercitationes Geometricae* in *response* to Huygens' second article on his book or whether it was *Huygens* who was responding to Gregory's provocation.[20] The truth of the matter is far from clear. Huygens' second article criticizing Gregory's work appeared in the *Journal des*

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[15] Gregory, *Exercitationes Geometricae: A Jacobo Gregorio, Scoto, è R. Societate*. London: Moses Pit, 1668.

[16] From the portion of the *Exércitationes Geometricae* published in Huygens *Oeuvres*, vol. 6, 315.

[17] *Ibid.*, 316.

[18] See: Turnbull, *James Gregory*, 7, 53, 459.

[19] For example see: Dijksterhuis, "James Gregory," 479-480.

[20] Gallois, "Extrait d'Une Lettre de M. Hugens â l'Auteur du Iournal, touchant la Réponse que M. Gregory à faite à l'examen du Livre intitulé Vera Circuli & Hyperboles Quadratura, dont on a parlé dans le V. Iournal de cette année," *Journal des Sçavans* 4 no. 9 (1668): 109-112.

Sçavans on November 2/12 1669.[21] It refers only to the *Vera Quadratura* and makes no direct mention of the *Exercitationes Geometricae*, nor does it respond to the proofs or corrections that Gregory published in it. However, in one passage Huygens refutes Gregory's claim to have made a more precise approximation of the circle than Huygens had in his own *de Circuli magnitudine*.[22] This claim did not appear in Gregory's July 13, 1668 article. It did, however, appear in *Exercitationes Geometricae*.[23] This suggests that Huygens' second article was written, at least in part, in response to Gregory's book.[24] Also on November 2, 1668, Huygens complained at length about that very disagreement and others in a letter to Wallis about the insulting little book that Gregory had brought forward which was written most harshly, "acerbissimo scripto."[25] Although he never actually gave its title it is safe to assume that he was referring to the *Exercitationes Geometricae*.[26] A letter from Oldenburg to Huygens also suggests that the book was published between August 10, 1668 and October 22, 1668 during the summer adjournment of the Royal Society.[27] Oldenburg told Huygens that:

> As for Mr. Gregory's latest printed work, I can assure you that it was put together and made public quite unknown to out Society, which at that time was in recess.[28]

The fact that there is no discussion of Gregory's ill-behaviour in the dispute in Oldenburg's correspondence before the beginning of November, and a great deal of discussion afterwards, suggests that the book was published towards the end of this period.[29] Based upon the internal evidence and the correspondence, I believe that the *Exercitationes Geometricae* was probably published in late September or early October and therefore that it appeared before Huygens' second *Journal des Sçavans* article.

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[21] *Ibid.*, 109-112; Huygens, *Oeuvres*, vol. 6, 272-276.

[22] Gallois, "Extrait d'Une Lettre," 111.

[23] As reprinted in Huygens, *Oeuvres*, vol. 6, 315.

[24] To complicate matters for historians of this debate, Huygens also drafted a letter to Gregory discussing several mathematical issues, including those raised in the *Exercitationes Geometricae*, but is was never sent and is undated. Huygens, *Oeuvres*, vol. 6, 321-323.

[25] The exact words that he used to refer to the book were: "Caeterum cum libellus iste contumeliosus allatus est." *Ibid.*, 279-281.

[26] Huygens also drafted a letter to Gregory discussing several mathematical issues, including those raised in the *Exercitationes Geometricae*, but is was never sent and is undated. *Ibid.*, 321-323.

[27] Birch, *History*, vol. 2, 313.

[28] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 178.

Regardless of when exactly the *Exercitationes Geometricae* was published, the manner of Gregory's reply to Huygens' criticisms created a stir in the scientific community. In his letter to Oldenburg of November 3, 1668 Huygens remarked only in passing on "le mechant procedè de Mr. Gregory, ... parce que j'en parle assez amplement dans la lettre cy jointe à Mr. Wallis."[30] Wallis in his turn after at first defending Gregory's work quickly became angry with "all his ranting."[31] Furthermore, both Wallis and Oldenburg were concerned that the Royal Society not be seen as being involved in the debate. On November 4, 1668 Wallis wrote to Brounker because he was concerned that the dispute was one "wherein the Royall Society may to some seem concerned; but indeed is not so" and counseled against any involvement by the Society in adjudicating the dispute.[32] When Huygens complained about the way in which Gregory railed at him in *Exercitationes Geometricae*, Oldenburg assured him that it was published without the consent of the Royal Society and, moreover, that if the Society had known about it, they would have persuaded Gregory to behave differently:

> Quand au dernier Inprimé de Monsieur Gregory, ie vous puis assurer, qu'il fut composé et mis au public à l'insceu de nostre Societé, laquelle alors discontinuoit mesme ses Assemblées, et auroit sans doubte, si elle en

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[29] Gregory's debate with Huygens and his actions were discussed by several of Oldenburg's correspondents. After November no less that 22 letters discussing the debate are included among Oldenburg's extant correspondence. Oldenburg, *Correspondence*, vol. 5, 127-8, 138-9, 161-3, 177-8, 193, 204, 207-8, 250-9, 273, 282-3, 331-3, 337, 340-1, 343, 345-6, 372, 374, 417-9, 435-7, 451-3, 464, 466, 546, 549.

[30] *Ibid.*, 126-127. For the letter that Huygens sent to Wallis see the discussion above and Huygens, *Oeuvres*, vol. 6, 278-281.

[31] For Wallis' complaints about Gregory's intransigence see Oldenburg, *Correspondence*, vol. 5, 134, 162, 192, 204, 336-337, 343,

[32] *Ibid.*, 138-139.

> eut esté advertie, persuadé l'autheur à une autre maniere d'agir.[33]

The French scientific community was also appalled by Gregory's treatment of Huygens. Justel told Oldenburg that "on a trouvé estrange que Monsr. gregori ait traitté Monsieur Huggens dune maniere un peu rude" and that "Monsieur galois me'en parlé et s'en plaint."[34] The fact that Gregory had replied in such a fashion in print when he knew that others had warned him privately that he likely was at fault in his calculations was considered especially rude. As Wallis said to Oldenburg:

> Mr Gregory's impudence will reflect on himself, not on mee. And I am sorry for it, for his sake. I gave him private notice of his mistake, more then [*sic*] once; & told him what did remain to be proved. But did withall, endeavour (in my former to Mr Hugens) to fetch him off as well as ye nature of ye businesse would bear. He must now fetch off himself as well as he can. And I shal hereafter take heed at giving him advise. For if what private advise is given him must be answered in Print, & there mis-represented; hee cutts off ye opportunity of friendly advise.[35]

Clearly the scientific community both in England and France felt that this debate had moved beyond the realm of polite discourse and were disturbed by Gregory's behaviour.

The article that Huygens published in the *Journal des Sçavans* in response to Gregory's book elicited another reply from Gregory sent to Oldenburg for publication in the *Philosophical Transactions*.[36] Although the language used by Gregory in this letter was less controversial than that in *Exercitationes Geometricae*, from portions of the letter it is clear that Gregory still bore a significant amount of animosity towards Huygens and his criticisms:

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[33] *Ibid.*, 177.
[34] *Ibid.*, 207.
[35] *Ibid.*, 193.
[36] *Ibid.*, 250-260.

> As regards Huygens' comparison of his method with mine, I admit that my approximations of Propositions 20 and 21 are the same as his, but demonstrated by my own particular method. But Huygens does not seem to grasp my approximation at the end of Proposition 25; thereupon he contrives another of his own, proves it not to be mine, and then comparing his with mine claims the victory for himself; at length, the enemy not being in sight, he organized a Triumph. .... As for the rest of what Huygens has published, as it is foreign to my purpose I say nothing of it, except that Huygens' pronouncements (notwithstanding his very exact examination of this matter, as he calls it) are far surpassed by the achievements of my Appendix.[37]

Deciding whether to publish Gregory's rebuttal to Huygens is one of the few cases where the Royal Society exhibited editorial control over Oldenburg's journal. The issue was hotly debated, although very little concerning the debate was entered into the minutes of the meetings.[38] John Collins, Gregory's friend and London contact, wrote to him December 30, 1668 concerning one meeting of the Royal Society.

> Your answer [to Huygens] hath been read by the Lord Brounker, but his Lordship shewed an unwillingnesse to have it printed in the Transactions, at the which I am not a little perplexed, but whether he will absolutely persist in the same mind, and refuse to license the Transactions with your Response I cannot say.[39]

Despite the qualms of the Royal Society, there was no question in the minds of Gregory or his supporters that his reply to Huygens should appear in print in one way or another. On January 7, 1669 Collins wrote to Gregory again suggesting that:

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[37] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 258-259.

[38] The minutes record that part of the letter which Wallis wrote to Brounker concerning the debate was read at the December 3, 1668 meeting and a copy entered into the record book. The next entry concerning the debate does not appear until February 1, 1669 where permission was given to publish Gregory's reply in the *Philosophical Transactions*, "but withal, that care should be had of omitting all, that might be offensive." Birch, *History*, vol. 2, 332, 343.

[39] Turnbull, ed., "Correspondence," 54.

> If your answer be barred out of the Transactions and that the bookseller M^r Moses Pits refuseth to print it (which I have no reason yet to assert as having not mentioned it to him) then M^r Jonas Moore and myself will take care to have it done at our owne charge, but certainly the Bookseller will not refuse it, if he heares you have anything more to be published hereafter.[40]

To which Gregory replied:

> I thank you and Jonas Moore very heartily for you proffer [of publishing Gregory's reply to Huygens], but if my answer be not published in the Transactions, I am fully resolved (upon several accounts too tedious to be related here) to publish it in Edinburgh.[41]

At the same time Oldenburg and other members of the Royal Society were moving to stifle the debate. On January 11, 1669 Oldenburg wrote to Huygens:

> Although I have already seen what Mr. Gregory had said in reply to what you last published against him, there is as yet nothing printed and I do not know whether it will be thought proper to insert his reply (which is in Latin and makes up four handwritten pages, and is dated 15 December) in the *Transactions*, seeing that we wish to stifle rather than to nourish this kind of dispute between two people who are both members of our Society.[42]

But Oldenburg and other members of the Royal Society clearly recognized that Gregory would continue this debate, either in the *Philosophical Transactions*, where they had some chance of controlling the manner of his reply, or in some other printed venue. As Oldenburg warned Huygens later in the same letter:

> I do not doubt that Mr. Gregory would have his reply printed by some other means, which could not be prevented. However, he is much more moderate in this last paper than in the earlier ones, and does little besides

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[40] *Ibid.*, 60.

[41] *Ibid.*, 63.

[42] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 333.

> reasoning in his own fashion, without making many personal reflections.[43]

Wallis suggested a possible solution to the issue to Oldenburg in a letter written January 12 1669.

> That answer of his [Gregory's reply to Huygens' second article], I think may bee well inough printed, without doing any hurt, (with some preface declaring yourself not interested, nor ye society, in ye expressions of it, but onely & as done to satisfy ye desire of Mr Gregory;) Because I beleeve M. Hugens doth expect it; & means at once to say what he hath to say both to it, & to his Appendicula, of which in ye last he had not taken notice. And it will rather shorten then lengthen the ye contest. For if M. Hugens first answere it, & then this be otherwise published it will make a double work, & more papers.[44]

Wallis also suggested that Gregory be warned that his behaviour towards Huygens was not appropriate and that "therefore he ought for ye future to take notice of M. Hugens with more of respect (as he deserves) or that it will not be thought proper for ye Transactions."[45] Oldenburg had been writing to Gregory, keeping him abreast of developments. In a letter written January 16, 1669 he warned Gregory that although he had received his reply to Huygens' article, "how and when it may be printed, is not yet resolvd, nor will be, till we hear further from you" and that Wallis "and other Eminent men amongst us wish, you had and would for the future take notice of yr Adversary wth more respect, as he deserves."[46] Gregory's reply was finally published, but only after further discussion by the Royal Society and Wallis' intervention. Collins wrote to Gregory February 2, 1669 telling him about the outcome of the meeting:

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[43] *Ibid.*, 333.

[44] Oldenburg, *Correspondence*, vol. 5, 337.

[45] *Ibid.*

[46] *Ibid.*, 340-341.

> Last night at a Councill of the Royall Societie it was voted that your Answer and Papers shall be printed in the next Transactions, and truly that they are so to be, doctor Wallis was Instrumentall, for I presume a Coppy of them was sent him, and he wrote twice to have them printed, albiet he doth not graunt you have put the demonstration out of Doubt (as it seems he hath signifyed to you) albiet he admits the Doctrine, but he desires not to be entangled in the Controversie.[47]

Although we have seen Oldenburg acting in the past to stir up debate between members of the scientific community, in this case he moved strongly to end the debate. When he wrote to Huygens on February 4, 1669, to give him notice of the publication of Gregory's second letter in the *Philosophical Transactions* he hoped:

> that this dispute may be quite finished and that there will be no need to entertain the readers of these journals with particulars which testify to heat and animosity on the part of persons of merit, and beside that, even give rise to a shadow of doubt about the very uncertainty of mathematical knowledge.[48]

Four days later Oldenburg wrote again to Huygens:

> Sir, you will not fail to ponder over the document that reviews the state of the controversy between you and Mr. Gregory, and doubtless your own good sense will suggest to you the best means for bringing this dispute to an end without hard feelings; for its bitterness we blame your opponent very much, who nevertheless will behave better in the future; of this you will see some proof in what is about to be printed from him against your last letter.[49]

Although Oldenburg and Wallis blamed the deterioration of the debate on Gregory's actions, another member of the Royal Society, Sir Robert Moray had another opinion. Moray had attempted to gain a better understanding of the debate by reading the books and articles involved and by discussing it in correspondence with Collins, Gregory, and Huygens.[50] Moray gave both parties equal blame. In a letter which he wrote to Huygens on February 5, 1669 he blamed some of Gregory's actions on his youth. However, he did not approve of the manner in which Gregory proceeded against Huygens and felt that Gregory had acted against the rules of moral conduct with his rude behaviour. Nevertheless, Moray told Huygens that part of the debate was his fault, since he had not answered Gregory's request privately by letter before publishing it in the *Journal des Sçavans*. Moray also felt that Huygens had been unfair in his accusations of plagiarism, since there were several occasions where two people invented the same thing without copying from one another.[51] Gregory's reply to Huygens finally appeared in the February 15, 1669 issue of the *Philosophical Transactions*, two months after he had first sent it to the Royal Society.[52] It seems that Oldenburg edited the letter somewhat in order "to soften some of Gregory's language towards Huygens."[53] It also appeared with a short preface written by Oldenburg in which he said that "it was thought equitable to make publick" Gregory's reply to Huygens' letter in the *Journal des Sçavans* and that

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[47] Turnbull, ed., "Correspondence," 65.
[48] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 374.
[49] *Ibid.*, vol. 5, 383.

> we are no longer concern'd in this contest, then to let the Sagacious Reader know the proceedings thereof ... which as 'tis intended to be done without any animosity or offence, so we desire the Candid *Reader* will pardon us for diverting him so much by this dispute from what else he might justly expect in these Philosophical Occurrences.[54]

With the publication of this letter the debate quickly drew quickly to a close. Huygens felt that the discussion was no longer particularly worth pursuing. As he wrote to Oldenburg after receiving the February 15, 1669 issue of the *Philosophical Transactions*:

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[50] Dijksterhuis, "Gregory," 484.

[51] Huygens, *Oeuvres*, vol. 6, 370-371.

[52] Gregory, "An Extract Of Mr. James Gregory to the Publisher, containing some Considerations of his, upon M. Hugens his Letter, printed in Vindication of his Examen of the Book, entitled Vera Circuli & Hyperbola Quadratura," *Philosophical Transactions* 3 no. 44 (1669): 882-886.

[53] Notes to letter 1045a written by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 260.

[54] Gregory, "Of a Letter," 882.

> From Mr. Gregory's reply it seems to me that he is much embarrassed by my last review, for instead of replying to it pertinently he only seeks so to embrangle the argument and to confuse it that from now on no one can comprehend the first thing about it.[55]

For his own part Gregory seems to have been angered by the preface to his letter and disheartened by the whole matter:

> Seeing the Transactions of February last, I was altogether discouraged, by the lines prefixed to my answer to Huygens ... I do not know (neither do I desire to know) who calleth, in that preface, Hugenius his animadversions of Nov. 12, 1668, judicious, but I would earnestly desire that he would particularize (if he be not an ignorant) in what my answer, which is contradictory to Hugenius his animadversions is faulty: ... I do not know what need there was of any apology for inserting my answer, but to compliment Hugenius, and violently (if it be possible) to bear down the truth. I imagined such actions below the meanest member of the R. Society: however, I hope I may have permission to call to an account in print the penners of that preface.[56]

Gregory never did call the writers of the preface to account in print. No further letters on the topic were published nor did reviews of *Exercitationes Geometricae* appear either in the *Philosophical Transactions* or in the *Journal des Sçavans*, despite the fact that they had been planned.[57] From the contents of his letters to Huygens and Gregory, it is quite clear that Oldenburg, both as editor of the *Philosophical Transactions* and Secretary of the Royal Society, was moving to stifle a debate which he and others believed was doing more harm than good. Once each of the opponents had received an equal chance to make his points in the journal of his choice, Oldenburg stated that no more on the debate would be published in the *Philosophical Transactions*. Oldenburg appears to have been generally successful in ending the discussion as the debate withdrew from the realm of print and essentially from the correspondence, although at least one more acrimonious letter was exchanged between Huygens and Collins, Gregory's staunchest supporter.[58] In fact any hard feelings between Huygens and Gregory seem to have mended quickly as Huygens recommended Gregory and Nicholas Mercator, a Danish mathematician then living in England, for a French government pension in 1671.[59]

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[55] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 453.
[56] Turnbull, ed., "Correspondence," 77.
[57] Collins was willing to write the review for the *Philosophical Transactions* and he had received news that a similar review was being planned in the *Journal des Sçavans*. See *Ibid.*, 55, 66.

This debate reveals important information about the readership of the journals and about the English and French scientific communities. This dispute was carried out as a dialogue between two people in the pages of the two journals. None of the articles that appeared in one journal were reprinted in the other. This is significant because it suggests that enough members of the intellectual communities in England and France who might be interested in the debate either received both journals or news of both journals. On all previous occasions, like the blood transfusion dispute, the journals reprinted the articles that had appeared in the other journal so that the debate would make sense to their readers. The discussion was carried out in Latin and in French which no doubt eased communication to the non-English-reading public.

Since both the published and private portions of this debate are available, we may use it to learn a great deal about the process by which the scientific community judged these rival claims. The correspondence suggests that scientific communities in both England and France were developing a code of conduct by which to behave during these types of printed debates. The consternation seen on both sides of the English Channel in Oldenburg's and Huygens' correspondence reveals that it was part of an international social convention that one's opponent be treated with respect.

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[58] For Huygens' response to Oldenburg on Collins' missive see Oldenburg; *Correspondence*, vol. 5, 452.
[59] Turnbull, ed., "Correspondence," 185-7

However, the different ways that Huygens and Gregory were treated by members of the scientific community show that multiple factors including rank, merit, and social standing were included in the decision-making process.[60] Huygens was an established scholar, while Gregory was just beginning his career, and therefore many members of the community took Huygens' complaints very seriously. Huygens' comments towards Gregory were just as rude as Gregory's were to him, yet his rank excused his actions towards Gregory for most of the community.[61] Other venerable natural philosophers were given similar latitude in their behaviour, as we saw in the debate between Wallis and Dulaurens.[62] Yet at the same time an ideal of fairness was maintained by the community. Huygens too subscribed to this ideal, when it suited him. During the period in which this debate was ongoing Huygens sent a theory to Oldenburg in cipher to be placed in the Register Book alongside other theories:

> To assure to everyone the honor due him, which in my opinion ought to be equally assigned to all those who find out a thing for themselves without regard to the time [when it was done], provided that they can state firmly that they have made the discovery without any assistance.[63]

However, Huygens was not willing to agree with Moray that Gregory seemed to have come to his discoveries independent of knowledge of Huygens' own work and grant him credit for his advancements.

As a corporation, the Royal Society did not want to get directly involved in the debate because it was disruptive and destructive. Huygens and Gregory's dispute was not merely a question of fact that they could come to some agreement about as they had in the dispute between Auzout and Hevelius.[64] The key points of the dispute dealt with mathematical rhetoric and could not be proved or disproved at this time. The Society wished to end the debate and regain peace among its Fellows. It did so by behaving as equitably as possible towards the participants, while at the same time encouraging them to end their dispute. Oldenburg's dual role as editor of the *Philosophical Transactions* and Secretary of the Royal Society was also at play here. As editor, Oldenburg wished productive debates to be published in his journal. However, disputes that had deteriorated were not as interesting to his readers. As Secretary of the Royal Society he wished, along with the rest of the Society, to make peace between two of its members warring in a debate that was not only futile but might damage the standing of the participants, the Society or, possibly, the very scientific enterprise itself.

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[60] Unlike the blood transfusion debate, the question of nationality never arose during this dispute. For details on this debate see chapter 2.
[61] Only Collins and Moray complained about Huygens' behaviour.
[62] See chapter 2.
[63] As translated by A.R. Hall and M.B. Hall in Oldenburg, *Correspondence*, vol. 5, 362.
[64] See chapter 2.

This chapter has shown that by 1669, the contents of the *Philosophical Transactions* and the *Journal des Sçavans* were available to all of the interested mathematicians in Europe, either directly, or through correspondence. It has also revealed that there were unwritten rules by which natural philosophers were supposed to address their opponents in print. Rude behaviour on the part of combatants in a dispute could result in censure, as it did in Gregory's case. However, as the community's treatment of Wallis and Huygens has shown, the severity with which these rules were applied depended upon the rank, merit, and social standing of the individual concerned.

Conclusion:
Different Communities, Different Needs, Different Journals

When I began researching this thesis, I had intended to carry out a direct comparison of the contents of the *Philosophical Transactions* and the *Journal des Sçavans* and examine how the journals interacted with one another. Unfortunately, the contents of the two journals are too different to compare directly; the topics that they cover are simply too divergent.[1] Even confining the analysis merely to topics concerning natural philosophy and medicine does not yield significant results since these subjects make up only about 30% of the *Journal des Sçavans*' contents. These articles are not numerous enough to compare them fairly to the contents of the *Philosophical Transactions*. Instead, I wondered why these two journals, ostensibly created for the same purpose, were so different. I concluded that the *Philosophical Transactions* and the *Journal des Sçavans* were in fact the creations of two very different communities and were designed to serve the needs of those communities. By examining the contents of these journals, we can gain significant insights into the communities that created them and into the rules that they were developing to govern printed discourse within the journals. We can follow the changing interests of the journals' audiences in response to external and internal factors and observe the way that the journals were used, or not used, by their communities to transmit and discuss new information, establish priority of discovery and arbitrate disputes.

In 1665, the first scientific and intellectual journals were introduced to the members of the Republic of Letters and ushered in a new mode of communication. As this study has shown, the *Philosophical Transactions* and the *Journal des Sçavans* were two very different journals which served different constituencies and played different roles for their audiences. The journals were created in unique social, political, and religious environments and the format and control of the *Philosophical Transactions* and the *Journal des Sçavans* reflect that, as well as the information and communications needs of the groups that created them. The analysis of the contents of the journals carried out in chapters 2 and 3 has also shown the different ways that each of the journals was used by their readers. Additionally, as the format and content of the journals was affected by the readers, so too did the journals help to shape the interests of the audience that they served. However, these two journals did not exist in a vacuum; they interacted with one another as well as with their readers. The creation of the scientific journal introduced a new means of communicating scientific information to European natural philosophers. This study has illustrated not only the type of information transmitted in this new way but also the rules that the community were creating to govern these interactions.

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[1] For the results of this attempted analysis see Appendix 4, Attempted Comparisons of the *Philosophical Transactions* and the *Journal des Sçavans*.

As the discussion in chapter 1 has shown, the structure of the scientific communities in England and in France was quite dissimilar in the period between 1665 and 1670. English scientific societies were generally stable and well-organized. They usually concerned themselves strictly with discussing natural philosophy and eschewed topics concerning politics and religion. Although the Royal Society, the main English scientific society by 1665, was centered in London, it maintained strong ties with Fellows and non-Fellows throughout England and abroad via a wide correspondence network. This correspondence was carried out by several Fellows but fell mainly to the Secretary of the Royal Society, Henry Oldenburg. As we saw in the beginning of chapter 2, Robert Moray, Robert Hooke and other members of the Royal Society had been considering using print to ease the burden of scientific correspondence. When Oldenburg suggested that he begin privately publishing a scientific journal early in 1665, the Society was supportive. The journal that Oldenburg created reflected the nature and needs of this scientific community. It was intended from the outset to be a more efficient means of communicating news of discoveries in fields relating to natural philosophy. The situation in France was markedly different. As we saw in chapter 1, the French natural philosophical community had a very broad range of interests. Rather than confining their meetings to the discussion of philosophy as their English counterparts did, French philosophers discussed literature, politics, history and religion alongside natural philosophy. They, like the rest of the French educated elite, believed that a wide variety of interests was a sign of erudition. The journal created by the Académie des Belles Lettres et Inscriptions to serve that broader intellectual community therefore reflects the entire French Republic of Letters and not just the natural philosophical community. The *Journal des Sçavans* was designed with a specific kind of utility for its readers in mind. It provided its audience with summaries and reviews of the latest French and European books available in Paris and also with the latest political, ecclesiastical, and scientific news. Additionally, as discussed in chapters 1 and 3, the French scientific community was in a state of flux during the period between 1665 and 1670. With the creation of the Académie des Sciences in 1666, the French scientific community moved away from its traditionally open stance on communication and became a less vibrant community where research was carried out by a secretive state funded and selected few. Although the *Journal des Sçavans* did not serve just the French natural philosophers, the use and format of the journal may also be used to gain insights into their portion of the community. Unlike the *Philosophical Transactions*, the *Journal des Sçavans* never came to be seen as a communications nexus by the Parisian scientific community or as a place in which to publish or debate scientific discoveries. Rather it remained, as it was for the community at large, a place in which to find the latest scientific books summarized and reviewed and where news of discoveries made in England and Italy were occasionally published.

The manners in which these journals were created and controlled were markedly different and reflect the social, political, and religious situations in England and France. As discussed in chapter 2, the *Philosophical Transactions* was essentially the private undertaking of Oldenburg, and intended to be a money-raising endeavour. The journal had no ties at all to the English government. Unlike the *Journal des Sçavans*, the *Philosophical Transactions* was not used as a vehicle for the publication for political propaganda, although Oldenburg did occasionally use it to publish pro-natural philosophy rhetoric.[2] The *Philosophical Transactions* maintained only unofficial ties with the Royal Society, despite the fact that it was published by its printer and under its license. It was only in extremely rare circumstances, as in the dispute between Gregory and Huygens, that the other members of the Royal Society involved themselves in the publication of the *Philosophical Transactions*. In fact, both the journal and the Society benefited from the confusion surrounding its official status.[3] The case of the *Journal des Sçavans* was markedly different.[4] The *Journal des Sçavans* was created under the auspices of a royal académie and edited by auxiliary members of that group. However, in addition to serving the intellectual community, it was destined to fulfill a political mandate for its patron Colbert as well. While fulfilling these responsibilities the editors of the *Journal des Sçavans* were also accountable to their politically and religiously powerful readers, as the issues surrounding the suppression of the journal which were discussed in chapter 3 revealed. The religious situation in France also affected the contents of the journal. Not only did the number of books written by Jesuits reviewed in the *Journal des Sçavans* increase after 1666, but the scientific material published in the journal often reflected that religious and political reality regardless of the actual research of Parisian scientists. The different ways in which these two journals were created and controlled is reflective of the communities in which they were created and whom they served. The *Journal des Sçavans* was created to fulfill a specific role in the communication of intellectual information and to play a part in the centralization of French intellectual life which was being undertaken by Louis XIV. In contrast, the *Philosophical Transactions* was created as a money-making enterprise to help fund the Secretary of a society which despite its name received no royal funding and to spread scientific information more readily than by correspondence.

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[2] See especially the introduction to the second volume. Oldenburg, "A Preface To the Third Year of these Tracts," *Philosophical Transactions* 2 no. 23 (1667): 409-415.

From the outset, the editors of these journals had very different intentions for their creations; Oldenburg wanted to spread and encourage the discovery of knowledge while Sallo and Gallois wanted to provide their readers with reviews of the latest available books on a wide variety of topics. The editors achieved their goals and satisfied their communities doing so, for the journals succeeded and remained in essentially the same format throughout the five years of this study. Oldenburg intended his journal:

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[3] See chapter 2 for the extended discussion.

[4] See chapter 3 for details.

> to the end, that such [philosophical] Productions being clearly and truly communicated, desires after solid and usefull knowledge may be further entertained, ingenious Endeavours and Undertakings cherished, and those, addicted to and conversant in such matters, may be invited and encouraged to search, try, and find out new things, impart their knowledge to one another, and contribute what they can to the Grand design of improving Natural knowledge, and perfecting all *Philosophical Arts*, and *Sciences*. All for the Glory of God, the Honour and Advantage of these Kingdoms, and the Universal Good of Mankind.[5]

He met those goals in the first volume of his transactions. When he reflected back on the first two years of the *Philosophical Transactions* Oldenburg said "I think, I may safely assume, that in these *Fragments*, something hath been contributed to sowe such seeds, as may somewhat conduce to the illustration and improvement of Philosophy."[6] In the introductions to the third and fourth volumes, Oldenburg reiterated these goals, reviewed the major discoveries made, hoped that the following year would be better than the previous ones and thanked his correspondents for their role in making the journal a success.[7] As he stated so clearly in the introduction to the fourth volume:

> And now, I think, we may take our Prospect, and see, that we have got more ground in our second Volume than in the first; and more yet in the third than in either of the former; whence we take the liberty to ominate well for the future. Yet in all this I assume nothing to

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[5] Oldenburg, "Introduction," 2.

[6] Interestingly, most of this preface was made up of a defence of natural philosophy against its detractors. Oldenburg, "Preface To the Third Year," 409-415.

[7] Oldenburg, "An Introduction To the Fourth Year of these Tracts," *Philosophical Transactions* 3 no. 33 (1667): 629-630; Oldenburg, "A Preface To this Fifth Year of the Transactions," *Philosophical Transactions* 4 no. 45 (1669): 893-898.

> my self, but give all what is due to the merits of my generous Correspondents.[8]

Sallo and Gallois too set out specific goals for the *Journal des Sçavans* which they met. As we saw in chapter 3, they were very concerned with the journal's possible usefulness for its audience. As Sallo informed his readers:

> Le seul denombrement des choses qui le composeront pourroit suffire pour faire connoistre l'vtilité. Mais i'adiousteray qu'il sera tres aduantageux à ceux qui entreprendront quelque ouurage considerables puis qu'ils pourront s'en seruir pour publier leur dessein, & inuiter tout le monde à leur communiquer les manuscripts, & les pieces fugitiues qui pourront contribuer à la perfection des choses qu'ils auront entreprises.[9]

When Gallois revived the *Journal des Sçavans* in 1666 his intentions for the journal remained much the same and the readers of the journal wished it to remain that way:

> Car tous les gens de lettres ont tesmoigné un extréme regret d'estre privez d'un Ouurage qu leur faisoit voir en racourcy ce qu'il y a de plus beau dans tous les livres, & qui leur donnoit en mesme temps beaucoup de plaisir par la diversité des choses qui y estoient rapportées. ... Et cela estant, on est assuré qu'il n'y aura personne qui n'ait de la ioys de voir review un Ouurage aussi utile & aussi agreable que celuy cy.[10]

Although neither Sallo nor Gallois were given to the editorial musings of Henry Oldenburg, the continuation of the Journal des Sçavans in its original format is sufficient proof that it was fulfilling the needs of it readers. Even though the opportunity existed for both journals to influence the other both journals remained true to the original visions of their creators.

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[8] Oldenburg, "Preface To this Fifth Year," 893-898.
[9] Sallo, "L'Imprimevr," i.
[10] Gallois, "L'Imprimevr," v.

The different formats and contents of the journal reflect the needs of the communities that they served. The major difference between the two journals was the number of books reviewed within them. The *Journal des Sçavans* was designed primarily to review a broad selection of books available in Paris. The contents of the journal reflected that. Book reviews formed the majority of the contents of the *Journal des Sçavans*, from a high of 84% in 1665 to a low of 72% in 1668. The topics covered ranged widely but history, religion, natural philosophy, and literature were the most popular.[11] Book reviews were also included in the *Philosophical Transactions*, although their appearance evolved over time. The first book reviews in the *Philosophical Transactions* were articles on individual books, very similar in appearance to those in the *Journal des Sçavans*.[12] In number six, several reviews appeared at the end of the issue.[13] After this Oldenburg began experimenting with a new format. In issue eight he began gathering several shorter book reviews into one article at the end of an issue.[14] Beginning in number 14, Oldenburg began saving these reviews to single articles included at the end of the issue and, with very few exceptions, book reviews remained confined to this type of article.[15] Although book reviews appeared in almost every issue of the *Philosophical Transactions*, they were never as important a part of that journal as they were in the *Journal des Sçavans*. The bulk of the *Philosophical Transactions* was reserved for reporting and discussing the latest discoveries in the natural philosophical world. This portion of the contents of the journal consisted largely of "articles" drawn from Oldenburg's correspondence. It is impossible to make a distinction between Oldenburg's personal correspondence and that which he carried out at the bequest of the Royal Society and others. Indeed, this is one of the factors that complicated the relationship between Oldenburg, the Royal Society, and the *Philosophical Transactions.*[16] As we saw in chapter 2, the topics covered in the *Philosophical Transactions* varied widely in response to the interests of the scientific community and both reflected and helped to shape the interests of that community.[17] The *Philosophical Transactions* and the *Journal des Sçavans* were created to transmit 'solid and usefull knowledge.' However, their creators and audiences had very different ideas of just what constituted that knowledge, and the journals reflect that fact.

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[11] For more detail see chapter 3. For the contents of the journal see also Appendix 3, Analysis of Interests in the *Journal des Sçavans*.

[12] For examples of the first book and printed letter reviews in the *Philosophical Transactions* see: Campani, "An Accompt of the improvement of Optick Glasses," *Philosophical Transactions* 1 no. 1 (1665): 2-3; Boyle, "An Experimental History of Cold," *Philosophical Transactions* 1 no. 1 (1665): 8-9.

[13] Oldenburg, "Of the way, used in the Mogol's Dominions, to make Saltpetre," *Philosophical Transactions* 1 no. 6 (1665): 103-104; Oldenburg, "Hevelius his Prodromus Cometicus," 104-108; Oldenburg, "Of the Mundus Subterraneus of Athanasius Kircher," *Philosophical Transactions* 1 no. 6 (1665): 109-117.

[14] This first article discussed seven books which were either published or in press which Oldenburg felt might be of interest to his readers. Oldenburg, "Of some Philosophical and curious Books, that are shortly to come abroad," *Philosophical Transactions* 1 no. 8 (1666): 145-146.

[15] This new form of book review article consisted of Oldenburg announcing that it would be an account of some books lately published and then listing those books by author and title followed by short reviews. The first such review was: Oldenburg, "Of some Books lately publish't; videl. I. The Relations of divers Curious Voyages, by Monsieur Thevenot, the third Tome, in French II. A Discourse about the Causes of the Inundation of the Nile, by Monsieur de la Chambre III. De Principiis & Ratiocinatione Geometrarum, Contra Fastum Professorum Geometriae, by Mr. Hobbes IV. King Solomons Pourtraiture of Old Age, by J. Smith, M.D.," *Philosophical Transactions* 1 no. 14 (1666): 248-254.

Although the *Journal des Sçavans* and the *Philosophical Transactions* did not influence one another's goals or format, they did contribute to one another's contents. Despite the fact that neither Sallo nor Gallois appear to have corresponded seriously with Oldenburg, the editors of both these journals were well aware of the content of the other. Articles or book reviews that appeared in one journal were not infrequently reprinted, usually in translation, in the other. Each journal credited the other as the source of the article, often even giving the issue and page numbers. As discussed in chapter 3, material borrowed from the *Philosophical Transactions*, and later the *Giornale de Letterati*, formed a significant portion of the *Journal des Sçavans*' scientific content. In fact, in 1666, 1667, and 1668, the three years of this study in which we see such borrowing, these articles formed 24%, 17%, and 29% of the total number of scientific and medical articles respectively.[18] These articles were mostly presentations that had been discussed before the Royal Society or particularly popular topics, like blood transfusion. Gallois also reprinted some of the Royal Society's requests for information towards the creation of a natural history and the judgment of the English Astronomers on the Hevelius-Auzout debate.[19] The *Philosophical Transactions* also served as the *Journal des Sçavans*' principal source for possibly heretical scientific information, such as the motion of planets about their own axes which French astronomers did not publish at home.[20] Because of its primarily book review format, the *Journal des Sçavans* relied heavily on the *Philosophical Transactions* as one of its major sources of current scientific news. Conversely, the *Philosophical Transactions* was far less reliant on the *Journal des Sçavans*, although it did provide the journal with an additional source for information on scientific discoveries in France and the rest of Europe and, infrequently, as a source of reviews of scientific books.[21] Although both journals used the other as a source of material for publication, the *Journal des Sçavans* was more reliant on the *Philosophical Transactions* than vice versa, particularly where scientific matters were concerned. The borrowing of articles from one journal to the other confirms that the material in the journals was considered of interest to the European intellectual community as a whole and not just to regional communities in England or in France.

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[16] For more detail see the discussion in chapter 2.

[17] See the discussion in chapter 2. For the contents of the journal see also Appendix 2, Analysis of Interests in the *Philosophical Transactions.*

[18] Articles taken from the *Philosophical Transactions* made up 20/85 scientific or medical articles in Volume 2 and 5/30 such articles in Volume 3. In Volume 4 the *Philosophical Transactions* contributed 6/31 scientific or medical articles and 3 were taken from the *Giornale de Letterati*. Although borrowed articles made up a large percentage of scientific articles they formed only 8%, 7%, and 12% of the total number of articles in Volumes 2, 3, and 4 respectively.

The uses of the *Journal des Sçavans* and the *Philosophical Transactions* by their readers were also significantly different and reflect the different nature of the scientific and intellectual communities in England and in France. As we discussed in chapter 3, the *Journal des Sçavans* was used by its readers primarily as a source of book reviews. Both the review format of the journal and the religious situation kept the *Journal des Sçavans* from being used as a place in which philosophers would publish news of their discoveries or attempt to claim priority for those discoveries. The *Journal des Sçavans* was not generally used as a forum to debate issues of interest to the French scientific community. However, it was used as one of several places for individuals to respond to claims put forth in the English journal.[22] The *Journal des Sçavans* was never intended to be used as a forum for general communication among members of the intellectual community, nor does it seem to have been used as a long-term reference work. Neither Sallo nor Gallois ever discussed the journal as anything more thar a useful source for bibliographic information. The *Journal des Sçavans* was only indexed twice during the period of this study, during Gallois' first year as editor. It is unclear when the index to the first year of the *Journal des Sçavans* was printed, or by whom it was written.[23] It was printed some time after the suppression, likely in the beginning of 1666 when it was clear that no more issues of the first volume of the journal would be appearing. This was also the only other year of the journal that was indexed.[24] No other indexes were made of the *Journal des Sçavans* during the period of this study. Since the *Journal des Sçavans* was written with usefulness for its readers in mind, it is likely that the readers found little use in the indexes or in keeping copies of the volumes for references. Rather the journal was used as an immediate source of reviews and information on books available in Paris.

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[19] Gallois and Royal Society, "Extrait contenant des instructions," *Journal des Sçavans* 193-196; Gallois and Royal Society, "Extrait touchant une nouvelle maniere," *Journal des Sçavans* 217-220; Gallois and English Astronomers, "Extrait sur la contestation," *Journal des Sçavans* 160.

[20] See the discussion in chapter 3.

[21] See the discussion in chapter 2.

The *Philosophical Transactions* was a markedly different journal. As we saw in chapter 2, the journal was intended from the outset to be a place where the latest scientific information gathered from all over Europe could be published. However, its role in scientific communication quickly moved beyond merely reporting recent discoveries. Under Oldenburg's guidance the *Philosophical Transactions* quickly developed into a communications nexus for the English and broader European scientific community. Despite the fact that it was written mostly in English, the contents of the journal quickly became known in the scientific circles of Europe through sales of licit and illicit copies and translations. Natural philosophers across the globe were encouraged to send their discoveries to be published in the journal in order to claim priority of discovery and credit for their accomplishments. Oldenburg also deliberately introduced these debates into the *Philosophical Transactions* and set up the journal as an impartial third party that could mediate these debates and utilized his position and contacts as Secretary of the Royal Society to support his position. As the analysis in chapter two illustrated, the contents of the journal reflected the interests of the scientific community and helped to shape them by encouraging research in particular areas. The *Philosophical Transactions* was also intended to be used by its readers as a reference work. It was regularly indexed and bound into volumes as we can see by examining the introductory epistles, dedications, and indexes. The first bound volume of the *Philosophical Transactions* was produced towards the end of May 1667.[25] At least part of the impetus to bind the issues of the *Philosophical Transactions* appears to have come from their publisher, John Martin. As Oldenburg wrote to Huygens in 1669, "this number of the *Transactions* has a table for all those of the whole of last year, finishing in the month of March, and the publisher was eager to make each year into a volume."[26] Volumes one, two, and four were dedicated and had those dedications inserted afterwards with the frontispieces.[27] Each of the volumes of the *Philosophical Transactions* had an index. In the first volume Oldenburg provided two types of indices. The first index organized names, nouns, and subjects alphabetically. The second index worked according to "a more natural method" which seems to have been essentially subject based and organized randomly. The indexes were printed along with number 22, the final issue for that volume, and the pages were numbered accordingly.[28] The alphabetical index appears to have been more popular or useful because that is the type of index used subsequently. In the final issue of the second volume, Oldenburg advertised to his readers that he was intending to publish the index separately for those who wished to bind their volume together.[29] He published the index for Volume two along with the frontispiece and dedication in early March of 1668.[30] However, Oldenburg returned to printing the indicies along with the final issue of a given volume and the dedications and frontispieces were printed separately at a later time.[31] This regular collecting of the issues into volumes with frontispieces, dedications, and indexes suggests that the *Philosophical Transactions* was intended to be more than an ephemeral collection. It was to be kept, used, reused and searched by those interested in natural philosophy as a resource for their own endeavours.

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[22] For example, Huygens' use of the *Journal des Sçavans* to claim priority for the discovery of the laws of motion.

[23] Anonymous, "Table des Iournavx de l'Annee de M. DC. LXV," *Journal des Sçavans* 1 (1666?): four pages, un-numbered, appearing at the end of the first volume.

[24] Gallois, "Table des Iournavx de l'Annee M. DC. LXVI," *Journal des Sçavans* 2 (1666): 12 pages, un-numbered, appearing at the end of Volume 2.

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[25] The bound copy of the first volume of the *Philosophical Transactions* which Oldenburg presented to the Royal Society is dated May 30, 1667. Andrade, "Birth," plate 1.

[26] As translated by Hall and Hall in Oldenburg, *Correspondence*, Vol. 5, 437.

[27] Oldenburg, "Royal Society," 2 pages inserted before the first issue; Oldenburg, "Viscount Brouncker," 1 page printed along with the index and inserted before the first issue; Oldenburg, "Lord Bishop of Sarum," 2 pages inserted before the first issue.

As this thesis has shown, the analysis of these journals can be used to reveal a great deal about the nature of seventeenth-century scientific communication and the communities that they served. From both the authorship of the articles in the *Philosophical Transactions* and from what we can discern of its readership we can see that the journal served an international, albiet primarily English, audience. We can also observe the interests of that community and how they changed in response to external and internal events. Information on the community served by the *Journal des Sçavans* is considerably more scarce, although its editors stated that it served the gentlemen of the Republic of Letters. The wide variety and primarily book review nature of the contents of the *Journal des Sçavans* reflected the needs and interests of the Parisian intellectual community, whereas the *Philosophical Transactions* catered to an audience interested specifically in natural philosophy. The two journals were

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[28] Oldenburg, "The Philosophical Transactions of Two Years, 1665 and 1666, beginning *March* 6. 1665. and ending with *February* 1666; abbreviated in an Alphabetical Table: And also afterwards Digested into a more Natural Method," *Philosophical Transactions* 1 no. 22 (1667): 399-407.

[29] Oldenburg, "An Advertisement," 2 no. 32 (1668): 628.

[30] The frontispiece to the second volume, its dedication to Viscount Brounker, dated March 2, 1668, and the index for the issues of 1667 were all printed together and later bound into a volume with numbers 23-32. Oldenburg, "Viscount Brouncker," 1 page; Oldenburg, "An Index for the Philosophical Transactions of An. 1667, beginning with *Number* 23, and ending with *Numb*. 32.," *Philosophical Transactions* 2 (1668): 5 pages, un-numbered.

[31] The index for the third volume was published along with issue 44 but its pages were not numbered. Oldenburg, "An Alphabetical Table for the Third Volume of the Philosophical Transactions In the Year 1668," *Philosophical Transactions* 3 no. 44 (1669): six pages un-numbered after page 891. The dedication to Volume 4 is un-dated but appears to have been printed at a later date than number 45, the first issue of that year. Oldenburg, "Lord Bishop of Sarum," 2 pages un-numbered bound in with the frontispiece before number 45.

also used differently by their readers. The *Philosophical Transactions* quickly came to be seen as a forum for the communication and discussion of new scientific material and developed rules to govern that discourse which we can discern from the contents of the journal and the correspondence of its editor. In contrast, the *Journal des Sçavans* served mainly to keep its readers abreast of the available literature that might interest an educated Parisian gentleman. It was never intended to be a communications nexus for its audience, nor did it develop into one. In part this was because there was no coherent community for it to serve in this fashion. Both of these journals were intended to transmit 'solid and usefull knowledge' to their readers and each was created to meet the needs of its readers. The *Philosophical Transactions* and the *Journal des Sçavans* both appear to have done that successfully in their own way; they remained true to their original published versions and were used as templates for later intellectual and scientific journals.

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Appendix 1:
General Information

TABLE 1-1
GENERAL INFORMATION ON THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS*
1665-1670

	Volume 1	**Volume 2**	**Volume 3**	**Volume 4**
	1665-1667	**1667-1668**	**1668-1669**	**1669-1670**
Number of Issues	22	10	12	12
Number of Articles	162	80	81	84
Advertisements	2	2	0	1
Book Reviews				
Articles	24	8	13	12
Books Reviewed	43	20	35	36
% Book Reviews	15	10	16	14
Borrowed Articles				
Number of Articles	8	3	3	2
Source of Articles				
Philosophical Transactions				
Journal des Sçavans	8	3	1	2
Giornale de Letterati			2	
Corrections/Errata	8	4	1	12
Index	1	1	1	1

TABLE 1-2

GENERAL INFORMATION ON THE CONTENTS OF THE *JOURNAL DES SÇAVANS* 1665-1669

	Volume 1	Volume 2	Volume 3	Volume 4	Volume 5
	1665	1666	1667	1668	1669
Number of Issues	13	42	16	13	4
Number of Articles	92	239	72	76	19
Advertisements	0	0	0	0	0
Book Reviews					
Articles	77	188	57	55	14
Books Reviewed	77	188	57	55	14
% Book Reviews	84	79	79	72	74
Borrowed Articles					
Number of Articles	0	20	5	9	0
Source of Articles					
Philosophical Transactions		20	5	6	
Journal des Sçavans					
Giornale de Letterati				3	
Corrections/Errata	0	0	0	2	0
Index	1	1	0	0	0

Appendix 2:
Analysis of Interests in the *Philosophical Transactions*

TABLE 2-1
ANALYSIS OF THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS*
(Book Reviews Included)

	Volume 1		Volume 2		Volume 3		Volume 4	
	1665-1667		1667-1668		1668-1669		1669-1670	
	#	%	#	%	#	%	#	%
Number of Articles	162		80		81		84	
Optical Interests	50	31	7	9	14	17	6	7
Optics	21	13	1	1	10	12	1	1
Astronomy	44	27	7	9	5	6	5	6
Microscopy	2	1	0	0	1	1	0	0
Marine Interests	19	12	12	15	7	9	5	6
Navigation	6	4	2	3	0	0	1	1
Cartography	2	1	1	1	0	0	0	0
Sailing	3	2	2	3	0	0	1	1
Sea	0	0	5	6	0	0	0	0
Oceanography	3	2	0	0	0	0	0	0
Geography	7	4	0	0	0	0	2	2
Tidal Activity	6	4	3	4	5	6	0	0
Time	0	0	0	0	0	0	1	1
Magnetism	0	0	8	10	2	2	0	0
Atmospheric Interests	8	5	1	1	1	1	5	6
Atmosphere	1	1	0	0	0	0	0	0
Barometer	6	4	0	0	1	1	2	2
Meteorology	3	2	1	1	0	0	4	5
Air (Pressure)	0	0	0	0	1	1	2	2
Biological Interests	38	23	22	28	27	33	19	23
Anatomy	8	5	11	14	16	20	9	11
Biology	24	15	10	13	7	9	9	11
Agriculture	8	5	5	6	4	5	5	6
Terrestrial Interests	19	12	8	10	2	2	8	10
Geology	9	6	3	4	0	0	3	4
Metallurgy	5	3	0	0	0	0	0	0
Mining	10	6	6	8	2	2	3	4
Volcanism	1	1	0	0	0	0	3	4
Fossils	2	1	1	1	0	0	0	0
Chemistry	9	6	5	6	5	6	6	7
Crafts	4	2	3	4	0	0	0	0
Instruments	5	3	4	5	1	1	1	1
Mathematics	6	4	3	4	17	21	9	11
Medicine	23	14	23	29	19	23	15	18
Natural History	11	7	17	21	11	14	9	11
Natural Philosophy	6	4	8	10	3	4	2	2
Technology	24	15	14	18	7	9	12	14

TABLE 2-2
ANALYSIS OF THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS*
(Book Reviews Excluded)

	Volume 1		Volume 2		Volume 3		Volume 4	
	1665-1667		1667-1668		1668-1669		1669-1670	
	#	%	#	%	#	%	#	%
Number of Articles	138		72		68		72	
Optical Interests	42	30	6	8	10	15	5	7
Optics	19	14	0	0	9	13	1	1
Astronomy	36	26	6	8	1	1	4	6
Microscopy	1	1	0	0	1	1	0	0
Marine Interests	15	11	10	14	7	10	4	6
Navigation	6	4	2	3	0	0	1	1
Cartography	3	2	1	1	0	0	0	0
Sailing	0	0	2	3	0	0	1	1
Sea	3	2	4	5	0	0	0	0
Oceanography	3	2	0	0	0	0	0	0
Geography	6	4	0	0	0	0	1	1
Tidal Activity	0	0	3	4	5	7	0	0
Time	0	0	0	0	0	0	0	0
Magnetism	0	0	7	10	2	3	0	0
Atmospheric Interests	7	5	1	1	0	0	4	6
Atmosphere	1	1	0	0	0	0	0	0
Barometer	6	4	0	0	0	0	2	3
Meteorology	2	1	1	1	0	0	4	6
Air (Pressure)	0	0	0	0	0	0	1	1
Biological Interests	28	20	18	25	19	30	10	14
Anatomy	3	2	7	10	9	13	5	7
Biology	23	17	10	14	6	9	3	4
Agriculture	4	3	5	7	4	6	4	6
Terrestrial Interests	16	12	5	7	2	3	8	11
Geology	8	6	3	4	0	0	3	4
Metallurgy	5	4	0	0	0	0	0	0
Mining	8	6	3	4	2	3	3	4
Volcanism	1	1	0	0	0	0	3	4
Fossils	1	1	1	1	0	0	0	0
Chemistry	6	4	5	7	2	3	3	4
Crafts	4	3	3	4	0	0	0	0
Instruments	4	3	4	5	1	1	1	1
Mathematics	3	2	1	1	10	15	2	3
Medicine	20	14	21	29	13	19	10	14
Natural History	7	5	14	19	10	15	5	7
Natural Philosophy	2	1	5	7	0	0	0	0
Technology	19	14	13	18	6	9	10	14

TABLE 2-3
ANALYSIS OF THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS*
(Book Reviews Alone)

	Volume 1		Volume 2		Volume 3		Volume 4	
	1665-1667		1667-1668		1668-1669		1669-1670	
	#	%	#	%	#	%	#	%
Number of Articles	24		8		13		12	
Optical Interests	8	33	1	13	4	3	1	8
Optics	2	8	1	13	1	1	0	0
Astronomy	8	33	1	13	4	31	1	8
Microscopy	1	4	0	0	0	0	0	0
Marine Interests	4	17	2	25	0	0	1	8
Navigation	0	0	0	0	0	0	0	0
Cartography	0	0	0	0	0	0	0	0
Sailing	1	4	2	25	0	0	0	0
Sea	0	0	1	13	0	0	0	0
Oceanography	0	0	0	0	0	0	0	0
Geography	4	17	0	0	0	0	0	0
Tidal Activity	0	0	0	0	0	0	0	0
Time	0	0	0	0	0	0	1	8
Magnetism	0	0	1	13	0	0	0	0
Atmospheric Interests	1	4	0	0	1	8	1	8
Atmosphere	0	0	0	0	0	0	0	0
Barometer	0	0	0	0	1	8	0	0
Meteorology	1	4	0	0	0	0	0	0
Air (Pressure)	0	0	0	0	1	8	1	8
Biological Interests	10	42	4	50	8	62	9	75
Anatomy	5	21	4	50	7	54	4	33
Biology	1	41	0	0	1	8	6	50
Agriculture	4	17	0	0	0	0	1	8
Terrestrial Interests	3	13	1	13	0	0	0	0
Geology	1	4	0	0	0	0	0	0
Metallurgy	0	0	0	0	0	0	0	0
Mining	2	8	1	13	0	0	0	0
Volcanism	0	0	0	0	0	0	0	0
Fossils	1	4	0	0	0	0	0	0
Chemistry	4	17	0	0	3	23	3	25
Crafts	0	0	0	0	0	0	0	0
Instruments	2	8	0	0	0	0	0	0
Mathematics	4	17	2	25	7	54	7	58
Medicine	3	13	2	25	6	46	6	50
Natural History	4	17	3	38	1	8	4	33
Natural Philosophy	4	17	3	38	3	23	2	17
Technology	5	21	1	13	6	46	2	17

Appendix 3:
Analysis of Interests in the *Journal des Sçavans*

TABLE 3-1
ANALYSIS OF THE CONTENTS OF THE *JOURNAL DES SÇAVANS*
(Book Reviews Included)

	Volume 1		Volume 2		Volume 3		Volume 4		Volume 5	
	1665		1666		1667		1668		1669	
	#	%	#	%	#	%	#	%	#	%
Number of Articles	92		239		72		76		19	
Type of Articles										
Architectural	0	0	1	0	0	0	0	0	0	0
Artistic	1	1	0	0	0	0	1	1	1	5
Dedicatory	1	1	1	0	0	0	0	0	1	5
Editorial	3	3	2	1	1	1	0	0	0	0
Educational	0	0	2	1	0	0	0	0	0	0
Historical	27	29	78	33	27	38	18	24	5	26
Instructional	0	0	0	0	2	3	2	3	0	0
Legal	6	7	14	6	5	7	0	0	0	0
Letter to Editor	1	1	0	0	0	0	0	0	0	0
Linguistic	4	4	3	1	2	3	1	1	2	11
Literary	26	28	42	18	6	8	6	8	0	0
Math	0	0	10	4	3	4	3	4	2	11
Medical	8	9	22	9	15	21	15	20	4	21
Natural History	0	0	5	2	3	4	3	4	0	0
Natural Philosophy	3	3	0	0	0	0	2	3	1	5
News	7	8	6	3	0	0	0	0	0	0
Obituary	1	1	0	0	0	0	0	0	0	0
Philosophical	1	1	25	10	1	1	2	3	0	0
Political	9	10	23	10	7	10	2	3	1	5
Printing	0	0	2	1	0	0	0	0	1	5
Religious	22	24	59	25	23	32	17	22	4	21
Review	0	0	0	0	0	0	1	1	0	0
Scientific	9	10	69	29	17	24	17	22	4	21
Technological	6	7	26	11	7	10	4	5	1	5
Theological	0	0	0	0	9	13	7	9	1	5
Travelogue	2	2	8	3	3	4	0	0	0	0

TABLE 3-2
ANALYSIS OF THE CONTENTS OF THE *JOURNAL DES SÇAVANS*
(Book Reviews Excluded)

	Volume 1		Volume 2		Volume 3		Volume 4		Volume 5	
	1665		1666		1667		1668		1669	
	#	%	#	%	#	%	#	%	#	%
Number of Articles	15		52		16		21		5	
Type of Articles										
Architectural	0	0	0	0	0	0	0	0	0	0
Artistic	0	0	0	0	0	0	0	0	0	0
Dedicatory	1	7	1	2	0	0	0	0	0	0
Editorial	3	45	1	2	1	6	0	0	0	0
Educational	0	0	0	0	0	0	0	0	0	0
Historical	0	0	2	4	0	0	0	0	0	0
Instructional	0	0	0	0	0	0	0	0	0	0
Legal	2	13	1	2	0	0	0	0	0	0
Letter to Editor	0	0	0	0	0	0	0	0	0	0
Linguistic	1	7	0	0	0	0	0	0	0	0
Literary	0	0	2	4	0	0	0	0	0	0
Math	0	0	3	6	1	6	1	5	2	4
Medical	1	7	3	6	6	38	4	19	0	0
Natural History	0	0	1	2	1	6	1	5	0	0
Natural Philosophy	0	0	0	0	0	0	0	0	0	0
News	5	33	1	2	0	0	0	0	0	0
Obituary	1	7	0	0	0	0	0	0	0	0
Philosophical	0	0	2	4	0	0	0	0	0	0
Political	0	0	0	0	0	0	0	0	0	0
Printing	0	0	2	4	0	0	0	0	1	20
Religious	1	7	2	4	1	6	1	5	0	0
Review	0	0	0	0	0	0	1	5	0	0
Scientific	6	40	35	67	7	44	9	43	3	60
Technological	4	27	11	21	2	13	1	5	1	20
Theological	0	0	0	0	1	6	1	5	0	0
Travelogue	2	13	0	0	1	6	0	0	0	0

TABLE 3-3

ANALYSIS OF THE CONTENTS OF THE *JOURNAL DES SÇAVANS*

(Book Reviews Alone)

	Volume 1		Volume 2		Volume 3		Volume 4		Volume 5	
	1665		1666		1667		1668		1669	
	#	%	#	%	#	%	#	%	#	%
Number of Articles	77		189		56		55		14	
Type of Articles										
Architectural	0	0	1	1	0	0	0	0	0	0
Artistic	1	1	0	0	0	0	1	2	1	7
Dedicatory	0	0	0	0	0	0	0	0	0	0
Editorial	0	0	1	1	0	0	0	0	0	0
Educational	0	0	2	1	0	0	0	0	0	0
Historical	27	35	76	41	27	48	18	33	5	36
Instructional	0	0	0	0	2	4	2	4	0	0
Legal	4	5	13	7	5	9	0	0	0	0
Letter to Editor	1	1	0	0	0	0	0	0	0	0
Linguistic	3	4	3	2	2	4	1	2	2	14
Literary	26	34	40	21	6	11	6	11	0	0
Math	0	0	7	4	2	4	2	4	0	0
Medical	7	9	2	1	9	16	11	20	4	29
Natural History	0	0	4	2	2	4	3	5	0	0
Natural Philosophy	3	4	0	0	0	0	2	4	1	7
News	2	3	5	3	0	0	0	0	0	0
Obituary	0	0	0	0	0	0	0	0	0	0
Philosophical	1	1	23	12	1	2	2	4	0	0
Political	9	12	23	12	7	13	2	4	1	7
Printing	0	0	0	0	0	0	0	0	0	0
Religious	21	27	57	30	21	38	16	29	4	29
Review	0	0	0	0	0	0	0	0	0	0
Scientific	3	4	34	18	10	18	8	15	1	7
Technological	2	3	15	8	5	9	3	5	0	0
Theological	0	0	0	0	8	14	6	11	1	7
Travelogue	2	3	8	4	2	4	0	0	0	0

Appendix 4:
Attempted Comparisons of the *Philosophical Transactions* and the *Journal des Sçavans*

TABLE 4-1
ANALYSIS OF THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS* ACCORDING TO *JOURNAL DES SÇAVANS* AREAS OF INTERESTS
(Book Reviews Included)

	Volume 1 1665-1667		Volume 2 1667-1668		Volume 3 1668-1669		Volume 4 1669-1670	
	#	%	#	%	#	%	#	%
Number of Articles	162		80		81		84	
Type of Articles								
Architectural	0	0	0	0	0	0	0	0
Artistic	1	1	0	0	0	0	0	0
Dedicatory	2	1	2	3	1	1	2	2
Editorial	0	0	0	0	0	0	0	0
Educational	0	0	1	1	0	0	3	4
Historical	3	2	3	4	0	0	5	6
Instructional	1	1	0	0	0	0	1	1
Legal	0	0	0	0	0	0	1	1
Letters to the Editor	0	0	0	0	0	0	0	0
Linguistic	0	0	1	1	1	1	1	1
Literary	0	0	0	0	0	0	0	0
Mathematical	6	4	3	4	17	21	9	11
Medical	23	14	23	29	19	23	15	18
Natural History	11	7	17	21	11	14	9	11
Natural Philosophy	6	4	8	10	3	4	2	2
News	0	0	0	0	0	0	0	0
Obituary	1	1	0	0	0	0	0	0
Philosophical	3	2	1	1	0	0	2	2
Political	0	0	0	0	0	0	0	0
Printing	0	0	1	1	0	0	1	1
Religious	1	1	0	0	0	0	0	0
Review	1	1	0	0	0	0	0	0
Scientific	148	91	72	90	70	86	71	85
Technological	24	15	14	18	7	9	12	14
Theological	1	1	0	0	0	0	0	0
Travelogue	2	1	0	0	1	1	1	1

TABLE 4-2
ANALYSIS OF THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS* ACCORDING TO *JOURNAL DES SÇAVANS* AREAS OF INTERESTS
(Book Reviews Excluded)

	Volume 1 1665-1667		**Volume 2 1667-1668**		**Volume 3 1668-1669**		**Volume 4 1669-1670**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Number of Articles	138		72		68		72	
Type of Articles								
Architectural	0	0	0	0	0	0	0	0
Artistic	1	1	0	0	0	0	0	0
Dedicatory	2	1	2	3	1	1	2	2
Editorial	0	0	0	0	0	0	0	0
Educational	0	0	0	0	0	0	1	1
Historical	1	1	0	0	0	0	0	0
Instructional	0	0	0	0	0	0	1	1
Legal	0	0	0	0	0	0	0	0
Letters to the Editor	0	0	0	0	0	0	0	0
Linguistic	0	0	0	0	0	0	0	0
Literary	0	0	0	0	0	0	0	0
Mathematical	3	2	1	1	10	15	2	3
Medical	20	14	21	29	13	19	10	14
Natural History	7	5	14	19	10	15	5	7
Natural Philosophy	2	1	5	7	0	0	0	0
News	0	0	0	0	0	0	0	0
Obituary	1	1	0	0	0	0	0	0
Philosophical	0	0	0	0	0	0	0	0
Political	0	0	0	0	0	0	0	0
Printing	0	0	1	1	0	0	1	1
Religious	0	0	0	0	0	0	0	0
Review	1	1	0	0	0	0	0	0
Scientific	125	91	64	89	57	84	59	82
Technological	19	14	13	18	6	9	10	14
Theological	0	0	0	0	0	0	0	0
Travelogue	0	0	0	0	1	1	1	1

TABLE 4-3
ANALYSIS OF THE CONTENTS OF THE *PHILOSOPHICAL TRANSACTIONS* ACCORDING TO *JOURNAL DES SÇAVANS* AREAS OF INTERESTS
(Book Reviews Alone)

	Volume 1		**Volume 2**		**Volume 3**		**Volume 4**	
	1665-1667		**1667-1668**		**1668-1669**		**1669-1670**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Number of Articles	24		8		13		12	
Type of Articles								
Architectural	0	0	0	0	0	0	0	0
Artistic	1	4	0	0	0	0	0	0
Dedicatory	0	0	0	0	0	0	0	0
Editorial	0	0	0	0	0	0	0	0
Educational	0	0	1	13	0	0	2	17
Historical	2	8	3	38	0	0	1	8
Instructional	1	4	0	0	0	0	0	0
Legal	0	0	0	0	0	0	0	0
Letters to the Editor	0	0	0	0	0	0	0	0
Linguistic	0	0	1	13	1	8	1	8
Literary	0	0	0	0	0	0	0	0
Mathematical	3	13	2	25	7	54	7	58
Medical	3	13	2	25	6	46	6	50
Natural History	4	17	3	38	1	8	4	33
Natural Philosophy	4	17	3	38	3	23	2	17
News	0	0	0	0	0	0	0	0
Obituary	0	0	0	0	0	0	0	0
Philosophical	3	13	1	13	0	0	2	17
Political	0	0	0	0	0	0	0	0
Printing	0	0	0	0	0	0	0	0
Religious	1	4	0	0	0	0	0	0
Review	0	0	0	0	0	0	0	0
Scientific	23	96	8	100	13	100	12	100
Technological	5	21	1	13	1	8	2	17
Theological	1	4	0	0	0	0	0	0
Travelogue	2	8	0	0	0	0	0	0

TABLE 4-4
ANALYSIS OF THE CONTENTS OF THE *JOURNAL DES SÇAVANS* ACCORDING TO *PHILOSOPHICAL TRANSACTIONS* AREAS OF INTERESTS
(Book Reviews Included)

	Volume 1		Volume 2		Volume3		Volume 4		Volume 5	
	1665		1666		1667		1668		1669	
	#	%	#	%	#	%	#	%	#	%
Number of Articles	92		239		72		76		19	
Optical Interests	3	3	30	13	9	13	8	11	3	16
Optics	1	1	9	4	4	6	3	4	0	0
Astronomy	3	3	23	10	7	10	5	7	3	16
Microscopy	0	0	3	1	1	1	1	1	0	0
Marine Interests	3	3	19	8	2	3	2	3	0	0
Navigation	3	3	4	2	0	0	1	1	0	0
Cartography	0	0	0	0	0	0	0	0	0	0
Sailing	1	1	2	1	0	0	0	0	0	0
Sea	0	0	3	1	0	0	0	0	0	0
Oceanography	0	0	0	0	1	1	0	0	0	0
Geography	0	0	7	3	1	1	1	1	0	0
Tidal Activity	0	0	2	1	0	0	0	0	0	0
Time	0	0	1	1	0	0	0	0	0	0
Magnetism	0	0	2	1	0	0	0	0	0	0
Atmosphere	0	0	2	1	0	0	0	0	0	0
Atmosphere	0	0	0	0	0	0	0	0	0	0
Barometer	0	0	2	1	0	0	0	0	0	0
Meteorology	0	0	1	0	0	0	0	0	0	0
Air (Pressure)	0	0	0	0	0	0	0	0	0	0
Biological Interests	5	5	18	8	7	10	9	12	1	5
Anatomy	5	5	10	4	6	8	5	7	1	5
Biology	0	0	9	4	1	1	5	7	0	0
Agriculture	0	0	0	0	0	0	0	0	0	0
Terrestrial Interests	0	0	4	2	1	1	0	0	0	0
Geology	0	0	0	0	0	0	0	0	0	0
Metallurgy	0	0	1	0	0	0	0	0	0	0
Mining	0	0	3	1	1	1	0	0	0	0
Volcanism	0	0	1	0	0	0	0	0	0	0
Fossils	0	0	0	0	0	0	0	0	0	0
Chemistry	0	0	8	3	2	3	1	1	0	0
Crafts	0	0	0	0	0	0	0	0	0	0
Instruments	0	0	4	2	0	0	2	3	0	0
Mathematics	1	1	10	4	3	4	3	4	1	5
Medicine	7	8	25	10	8	11	13	17	4	21
Natural History	0	0	5	2	3	4	4	5	0	0
Natural Philosophy	3	3	8	3	2	3	2	3	1	5
Technology	6	7	26	11	7	10	4	5	1	5

TABLE 4-5
ANALYSIS OF THE CONTENTS OF THE *JOURNAL DES SÇAVANS* ACCORDING TO *PHILOSOPHICAL TRANSACTIONS* AREAS OF INTERESTS

(Book Reviews Excluded)

	Volume 1		Volume 2		Volume 3		Volume 4		Volume 5	
	1665		1666		1667		1668		1669	
	#	%	#	%	#	%	#	%	#	%
Number of Articles	15		52		16		21		5	
Optical Interests	1	1	19	37	4	25	3	14	3	60
Optics	0	0	6	12	3	19	1	5	0	0
Astronomy	1	1	14	27	3	19	2	10	3	60
Microscopy	0	0	2	4	1	6	1	5	0	0
Marine Interests	1	1	8	15	1	6	0	0	0	0
Navigation	0	0	2	4	0	0	0	0	0	0
Cartography	0	0	0	0	0	0	0	0	0	0
Sailing	1	1	2	4	0	0	0	0	0	0
Sea	0	0	3	6	0	0	0	0	0	0
Oceanography	0	0	0	0	1	6	0	0	0	0
Geography	0	0	0	0	0	0	0	0	0	0
Tidal Activity	0	0	2	4	0	0	0	0	0	0
Time	0	0	0	0	0	0	0	0	0	0
Magnetism	0	0	0	0	0	0	0	0	0	0
Atmosphere	0	0	2	4	0	0	0	0	0	0
Atmosphere	0	0	0	0	0	0	0	0	0	0
Barometer	0	0	2	4	0	0	0	0	0	0
Meteorology	0	0	1	2	0	0	0	0	0	0
Air (Pressure)	0	0	0	0	0	0	0	0	0	0
Biological Interests	1	1	7	13	2	13	5	24	0	0
Anatomy	1	1	1	2	1	6	4	19	0	0
Biology	0	0	7	13	1	6	2	10	0	0
Agriculture	0	0	0	0	0	0	0	0	0	0
Terrestrial Interests	0	0	2	4	1	6	0	0	0	0
Geology	0	0	0	0	0	0	0	0	0	0
Metallurgy	0	0	1	2	0	0	0	0	0	0
Mining	0	0	2	4	1	6	0	0	0	0
Volcanism	0	0	1	2	0	0	0	0	0	0
Fossils	0	0	0	0	0	0	0	0	0	0
Chemistry	0	0	3	6	1	6	1	5	0	0
Crafts	0	0	0	0	0	0	0	0	0	0
Instruments	0	0	2	4	0	0	1	5	0	0
Mathematics	0	0	3	6	1	6	1	5	1	20
Medicine	1	1	5	10	1	6	3	14	0	0
Natural History	0	0	1	2	1	6	1	5	0	0
Natural Philosophy	0	0	8	15	0	0	0	0	0	0
Technology	4	27	11	21	2	13	1	5	1	20

TABLE 4-6
ANALYSIS OF THE CONTENTS OF THE *JOURNAL DES SÇAVANS* ACCORDING TO *PHILOSOPHICAL TRANSACTIONS* AREAS OF INTERESTS
(Book Reviews Alone)

	Volume 1		**Volume 2**		**Volume 3**		**Volume 4**		**Volume 5**	
	1665		**1666**		**1667**		**1668**		**1669**	
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Number of Articles	77		187		56		55		14	
Optical Interests	2	3	11	6	5	9	5	9	0	0
Optics	1	1	3	2	1	2	2	4	0	0
Astronomy	2	3	4	5	4	7	3	5	0	0
Microscopy	0	0	1	1	0	0	0	0	0	0
Marine Interests	2	3	11	6	1	2	2	4	0	0
Navigation	3	4	2	1	0	0	1	2	0	0
Cartography	0	0	0	0	0	0	0	0	0	0
Sailing	0	0	0	0	0	0	0	0	0	0
Sea	0	0	0	0	0	0	0	0	0	0
Oceanography	0	0	0	0	0	0	0	0	0	0
Geography	0	0	7	4	1	2	1	2	0	0
Tidal Activity	0	0	2	1	0	0	0	0	0	0
Time	0	0	1	1	0	0	0	0	0	0
Magnetism	0	0	2	1	0	0	0	0	0	0
Atmosphere	0	0	0	0	0	0	0	0	0	0
Atmosphere	0	0	0	0	0	0	0	0	0	0
Barometer	0	0	0	0	0	0	0	0	0	0
Meteorology	0	0	0	0	0	0	0	0	0	0
Air (Pressure)	0	0	0	0	0	0	0	0	0	0
Biological Interests	4	5	11	6	5	9	4	7	1	7
Anatomy	4	5	9	5	5	9	1	2	1	7
Biology	0	0	2	1	0	0	3	5	0	0
Agriculture	0	0	0	0	0	0	0	0	0	0
Terrestrial Interests	0	0	2	1	0	0	0	0	0	0
Geology	0	0	0	0	0	0	0	0	0	0
Metallurgy	0	0	0	0	0	0	0	0	0	0
Mining	0	0	1	1	0	0	0	0	0	0
Volcanism	0	0	1	1	0	0	0	0	0	0
Fossils	0	0	0	0	0	0	0	0	0	0
Chemistry	0	0	5	3	1	2	0	0	0	0
Crafts	0	0	0	0	0	0	0	0	0	0
Instruments	0	0	2	1	0	0	1	2	0	0
Mathematics	1	1	7	4	2	4	2	4	0	0
Medicine	6	8	20	11	7	13	10	18	4	25
Natural History	0	0	4	2	2	4	3	5	0	0
Natural Philosophy	3	4	8	4	2	4	2	4	1	7
Technology	2	3	15	80	5	9	3	5	0	0